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# ERRATA

VOL. XV.

**Page 33, line 29, should read:**

"Our total accident rate per 10,000 shifts from July 17 to August 14, 1919, was 23.499, while the rate from July 17 to August 14, 1920, was only 9.114, a reduction of 61 per cent."

**Page 33, line 32, reading:** "After we had, etc.," should read: "After we **have**," and should begin a new paragraph.

**Page 11, Membership List:** The address of John T. Fuller should read, "Bauxite, Arkansas."



M

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*of the*  
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*of America*



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# Mining and Metallurgical Society *of America*



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## OFFICERS FOR 1922

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## COUNCIL

At large, ex-officio.

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| B. Britton Gottsberger, New York..... | Retires January, 1923 |
| Waldemar Lindgren, Cambridge.....     | Retires January, 1923 |
| J. E. Spurr, New York.....            | Retires January, 1924 |

Districts 1-2-3-4.

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| H. H. Knox, New York.....        | Retires January, 1923 |
| J. Parke Channing, New York..... | Retires January, 1924 |
| Pope Yeatman, New York.....      | Retires January, 1924 |
| W. R. Ingalls, New York.....     | Retires January, 1925 |

District 5—Pennsylvania.

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| George Otis Smith, Washington, D. C. .... | Retires January, 1923 |
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|                                  |                       |
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| Albert Burch, San Francisco..... | Retires January, 1923 |
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| W. J. Loring, San Francisco..... | Retires January, 1924 |
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| S. W. Mudd, Los Angeles..... | Retires January, 1925 |
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| Reno H. Sales, Butte ..... | Retires January, 1925 |
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# Mining and Metallurgical Society *of America*

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## ANNOUNCEMENTS

**Annual Meeting.**—The annual meeting of the Society was held at the Harvard Club, New York City, on Tuesday, Jan. 10, 1922. At the evening session, the Gold Medal of the Society was presented to Charles W. Goodale. An account of the meeting appears in this bulletin.

**New York Section.**—Meetings of the New York Section for the discussion of the report of the Committee on Foreign and Domestic Mining Policy were held at the Harvard Club, on Tuesday, Nov. 22, and Wednesday, Dec. 14, 1921. At the last meeting the following resolutions were adopted:

WHEREAS, the New York Section of the Mining and Metallurgical Society of America considers the report of the Committee on Foreign and Domestic Mining Policy to be of special and pressing importance in national and international affairs at this juncture, and urges furtherance of the Committee's work in order that the Society may play a part in promoting the cause; therefore be it

RESOLVED, that the New York Section of the Mining and Metallurgical Society of America approves the report of the Committee on Foreign and Domestic Mining Policy; and be it further

RESOLVED, that the New York Section of the Mining and Metallurgical Society of America would like to have the co-operation of the Institution of Mining and Metallurgy of Great Britain in the consideration of this report; and be it further

RESOLVED, that the Council of the Society be requested to institute a referendum among the members of the Society, and that an invitation be extended to the Institution of Mining and Metallurgy of Great Britain to co-operate with the Society in the consideration of the subject matter of this report.

An account of the discussions at these meetings will be issued shortly in connection with a referendum which is to be sent out to the membership dealing with the policy of the Society as to the formal approval of this report.

**Bound Volumes.**—Copies of the bound volumes of the 1920 proceedings have been forwarded to all those members who sent in orders. Any member who has not received his copy should communicate with the Secretary at once.

**Membership List.**—To obtain correct information for the list of members soon to be published, a return post-card was recently sent out. All members who have not yet returned this to the Secretary are requested to do so at once.

## COUNCIL

A meeting of the Council was held at the Harvard Club, New York City, on Tuesday, Jan. 10, 1922, at 4:30 p. m.

The meeting was called to order by the President, Mr. J. E. Spurr, those present being Messrs. J. Parke Channing, Charles W. Goodale, W. R. Ingalls, Allen H. Rogers, (President-elect) Pope Yeatman, W. Y. Westervelt, and B. Britton Gottsberger, Secretary.

The resignation of Dr. F. G. Cottrell, Councillor in District No. 6, accepted with much regret, and Dr. George Otis Smith was appointed to fill this vacancy until January, 1923.

**Joint Meeting With A. I. M. E.**—The Secretary reported that in consultation with the Secretary of the American Institute of Mining and Metallurgical Engineers, it was found that there was a good opportunity to hold a joint session with the Institute at its annual meeting. As the subject matter for such meeting, it was thought that "Waste in Industry as Applied to Mining" would be of considerable interest. The Council thereupon authorized the Secretary to proceed with the plans as outlined.

**Resolutions of New York Section.**—The resolutions adopted by the New York Section at a meeting held Dec. 14, 1921, dealing with the report of the Committee on Foreign and Domestic Mining Policy were submitted to the Council. After consideration of these resolutions the requests of the New York Section were approved.

At a later meeting of the Council held at 5 p. m., at which Mr. Allen H. Rogers, President-elect, presided, W. R. Ingalls and J. E. Spurr, were elected to serve on the Executive Committee for the year 1922.



## ANNUAL MEETING

### Afternoon Session

The afternoon session of the annual meeting of the Mining and Metallurgical Society of America was called to order by the President, Mr. J. E. Spurr, at 2:30 p. m., Jan. 10, 1922, at the Harvard Club, New York City.

The roll call indicating that 117 members were present either in person or by proxy, the chair ruled that a quorum was present.

The tellers appointed to canvass the votes for officers and councillors for the coming year submitted the following report:

Your tellers submit herewith canvass of ballots cast for the election of officers for the Society for the year 1922:

|  |     |
|--|-----|
| Total ballots cast.....                      | 203 |
| Ballots discarded for want of signature..... | 4   |
| Total canvassed .....                        | 199 |

The result of the canvass is as follows:

|                                    |                              |           |
|------------------------------------|------------------------------|-----------|
| For President:                     | Allen H. Rogers .....        | 121 votes |
|                                    | Arthur Thacher .....         | 74 "      |
|                                    | Fred Hellmann .....          | 1 "       |
| For Vice-President:                | William Young Westervelt.... | 102 votes |
|                                    | George Otis Smith .....      | 94 "      |
| For Secretary:                     | B. Britton Gottsberger ..... | 184 "     |
| For Councillor, Districts 1-2-3-4: | W. R. Ingalls .....          | 160 "     |
|                                    | A. R. Ledoux .....           | 67 "      |
| For Councillor, District 5:        | R. A. F. Penrose, Jr. ....   | 99 "      |
|                                    | H. M. Chance .....           | 73 "      |
| For Councillor, District 11:       | S. W. Mudd .....             | 159 "     |
|                                    | Arthur Notman .....          | 35 "      |
| For Councillor, District 12:       | Reno H. Sales .....          | 96 "      |
|                                    | Milnor Roberts .....         | 68 "      |
|                                    | (Signed) LOUIS D. HUNTOON,   |           |
|                                    | HARRY J. WOLF,               |           |

*Tellers.*

The President thereupon ruled that, having received the highest number of votes, the following officers were elected:

|                        |                          |
|------------------------|--------------------------|
| PRESIDENT:             | VICE-PRESIDENT:          |
| Allen H. Rogers        | William Young Westervelt |
| SECRETARY:             |                          |
| B. Britton Gottsberger |                          |

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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### COUNCILLORS

Districts 1-2-3-4: W. R. Ingalls

District 11: S. W. Mudd

District 5: R. A. F. Penrose, Jr.

District 12: Reno H. Sales

### REPORT OF THE SECRETARY

**Membership.**—Considering the extreme depression from which the mining industry has suffered during the past year, the Society has done well in not only maintaining its membership, but in closing the year with a net gain in members. Beginning with 300 members on Jan. 1, 1921, there was a loss of six by resignation and eight by death during the year. In all 18 new members were added during the year, but the election of five of these took place so late that no dues were collected. The membership at the end of the year therefore stands at 304. In addition there are three applications now pending which are ready for submission to the membership.

As in the past there has been no campaign for members, the Council having decided to leave this matter in the hands of the membership at large. It is hoped that this obligation will be borne in mind as, of course, the activity and usefulness of the Society depends upon the maintenance and healthy growth of its membership.

**New Committees.**—A number of new committees were appointed by the President during the year as follows:

Licensing of Mining Engineers,

Foreign and Domestic Mining Policy,

Mine Taxation,

Ethics,

Petroleum (to act as a sub-committee of the Committee on Foreign and Domestic Mining Policy).

Reports have already been submitted by two of these committees.

**Gold Medal.**—The Gold Medal of the Society for 1921, has been awarded to Charles W. Goodale for "Distinguished Service in Increasing the Safety of Men in Mining and Metallurgical Operations" and will be formally presented to him at the evening session of this meeting.

**Amendments to Constitution, By-laws and Rules.**—The three amendments to the Constitution, By-laws and Rules brought up for action at the last annual meeting were, in accordance with the action of that meeting, submitted to the membership of the Society for letter-ballot, the vote standing 94 in favor of all three amendments and three opposed. The amendments thereupon became operative.



**Federated American Engineering Societies.**—In order to determine the policy of the Society with regard to membership in the F.A.E.S. a referendum was submitted to the members. Consideration by the Council of the answers received indicated that, while a large majority of the members approved of the principles espoused by the federation, they felt that through other technical organizations to which they belong, they would obtain full representation which would only be duplicated if the Mining and Metallurgical Society joined. The Secretary was therefore instructed to decline the invitation to join the Federation making it clear, however, that that Society was in hearty accord with its objects and hoped by acting as an independent organization to further them.

**Bulletin.**—On account of the continued high cost of printing, the policy of limiting the number of issues of the Bulletin was continued, but as much valuable matter was available the volume of printing was greater than in the previous year. In all eight bulletins were issued and another is now in press. Four of these were formal reports by the following committees of the Society:

Committee on Post-Graduate Education,  
Committee on Vocational or Occupational Training for Metal Miners,  
Committee on Technical Education,  
Committee on Foreign and Domestic Mining Policy.

The other bulletins dealt principally with reports of discussions held at meetings of the New York Section. Considerable material of a similar nature is now in hand and available for the coming year if it be found possible to finance its publication.

**Formal Actions.**—A questionnaire on the subject of Licensing of Engineers sent out to the members, brought in many interesting replies which were placed in the hands of a committee for analysis. The result embodied in a report of the committee, showed a large majority opposed to the principles of licensing. The report was issued to the membership in multigraphed form, and is being printed in the bulletin now in press.

During the year the Council authorized a referendum to the membership dealing with the Metric System, in order to determine the policy of the Society on this question. A large number of replies to the questionnaire are now in hand, which will be placed in the hands of the Committee on the Metric System for analysis.

B. BRITTON GOTTSBERGER,  
*Secretary.*

# MINING AND METALLURGICAL SOCIETY OF AMERICA

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## REPORT OF THE TREASURER

I submit herewith report of the Auditor showing receipts and disbursements for the year 1921, and a statement of the assets and liabilities as of the end of that year.

### RECEIPTS

|   |                  |
|---|------------------|
| Cash on hand Jan. 1, 1921.....              | \$1,997.05       |
| Annual dues, 1920 .....                     | \$20.00          |
| Annual dues, 1921 .....                     | 4,295.00         |
| Annual dues, 1922 .....                     | 55.00            |
|   | <hr/> 4,370.00   |
| Sale of bound volumes, 1920.....            | 398.00           |
| Sale of bound volumes, 1921.....            | 4.00             |
|   | <hr/> 402.00     |
| Sale of old bound volumes .....             | 8.75             |
| Sale of Society badge .....                 | 5.00             |
| Luncheon at special meeting .....           | 35.00            |
| Dinner at annual meeting .....              | 85.00            |
| For use of telephone and stenographer ..... | 139.54           |
| Interests on deposits and bond .....        | 65.61            |
|   | <hr/> \$7,107.95 |

### DISBURSEMENTS

|  |                  |
|--|------------------|
| Office rent .....                          | \$912.36         |
| Stenographer .....                         | 1,500.00         |
| Office expenses, stationery, etc.....      | 638.88           |
|  | <hr/> \$3,051.24 |
| Annual Medal, 1921 .....                   | 130.00           |
| Annual meeting, 1921 .....                 | 106.15           |
| Annual meeting, 1922 .....                 | 6.00             |
|  | <hr/> 112.15     |
| Special meetings .....                     | 149.25           |
| Bulletin .....                             | 1,675.23         |
| Referendum votes .....                     | 39.85            |
| Loaned Local Section .....                 | 100.00           |
| National Chamber of Commerce .....         | 30.00            |
| List of Officers and Members .....         | 192.40           |
| Exchange on checks .....                   | 2.18             |
| Cash in bank and office, Jan. 1, 1922..... | 1,625.65         |
|  | <hr/> \$7,107.95 |

### ASSETS

|  |            |
|--|------------|
| Cash in bank and office, Jan. 1, 1922..... | \$1,625.65 |
| Dues payable, 1919 .....                   | \$70.00    |
| Dues payable, 1920 .....                   | 5.00       |



# MINING AND METALLURGICAL SOCIETY OF AMERICA

|  |        |            |
|--|--------|------------|
| Dues payable, 1921 .....                               | 135.00 |            |
|  |        | 210.00     |
| Payment on account of Annual meeting, 1922.....        |        | 6.00       |
| Due by Local Section .....                             |        | 100.00     |
| Office furniture and fixtures .....                    |        | 141.00     |
| 1 Bond—(New York City $4\frac{1}{2}\%$ —\$150.00)..... |        | 147.75     |
| Society badge on hand .....                            |        | 5.00       |
|  |        | <hr/>      |
|  |        | \$2,235.40 |

## LIABILITIES

|   |           |
|---|-----------|
| Life Membership .....                       | \$150.00  |
| Payment in advance for dues, 1922.....      | 55.00     |
| Payment in advance bound volumes, 1921..... | 4.00      |
| Reserve for unpaid bills .....              | 604.00    |
|   | <hr/>     |
|   | \$ 813.00 |

The above accounts have been audited and final entries have been made in the ledger by Charles T. Howell, auditor, the following being copy of his letter:

New York, Dec. 31, 1921.

Acting under appointment by the Treasurer of the Society, I have audited the accounts of the Mining and Metallurgical Society of America for the year 1921, and hereby certify that, to the best of my knowledge and belief, the statement of the receipts and disbursements are correctly set forth, and the balance sheet presents the true financial condition of the Society.

(Signed) CHARLES T. HOWELL.

I would call attention to the fact that the excess of assets over liabilities, amounting to \$1,422.40 is \$590.40 less than at the end of 1920. We have therefore exceeded our income by that amount in conducting the affairs of the Society for the year 1921, and this deficit is likely to be slightly increased by writing off certain back dues as uncollectible.

While it may be hoped that during the current year the cost of printing and other expenses may drop, such an outcome is not at present indicated. However, with continued economy it is evident that the resources of the Society are ample for its work for the current year.

**Dues.**—Based on a ballot sent out to the membership the dues for the year 1922 will again be placed at \$15 instead of \$10 as provided in the Constitution. The response of the membership to this appeal was very gratifying, a total of 168 replies being received, of which only seven were in the negative.

B. BRITTON GOTTSBERGER,  
*Treasurer.*

This was the first annual meeting of the Society at which papers were presented at the afternoon session, and in introducing this portion of the program, the President made the following remarks:

We have in mind this year to attempt a modification of existing precedent in introducing into the annual meeting some discussions and papers on subjects which are covered by the policy of the Society. This is a beginning which, if it meets with your approval, we hope will become a custom in succeeding years, and which may result in our having a very valuable annual opportunity for discussion by the Society.

Other societies, more or less similar in type to ours, centralize their activities around their annual meetings and these become the principal and most valuable features of the societies' activities. It is an example which I think this Society should emulate, and I hope and believe, from my experience with similar organizations, that such a beginning as we are making here today will develop, so that in years to come we shall look forward to the annual meeting as a gathering around the hearthstone which will lead to a very enjoyable occasion.

A paper on "The Mineral Resources of the United States" was presented by G. F. Loughlin, Chief of the Division of Mineral Resources of the United States Geological Survey, and discussed by Arthur Thacher and W. R. Ingalls.

An interesting talk on "Economics of the Potash Industry in the United States" was given by Dr. John E. Tieble.

A paper on "The General Features of Mining Education" was presented by George J. Young.

It has been decided to publish these papers, in bulletins to be issued later in the year along with other matter dealing with their special subjects.

### Evening Session

In the evening, 64 members and guests were present at the dinner given at the Harvard Club at 6:30 p. m., following which Mr. W. R. Ingalls as Chairman called the meeting to order, and after introductory remarks, called upon the retiring President, Mr. J. E. Spurr, for the presidential address.

### Presidential Address

**J. E. Spurr.**—The Mining and Metallurgical Society of America was founded in 1908 by a group who felt the need of a high-grade, restricted association of mining engineers, metallurgists and mining geologists. I propose to be perfectly frank in detailing its origin and subsequent history.



There is little doubt that one of the original causes which contributed to its organization was a dissatisfaction with some of the tendencies in the American Institute of Mining Engineers; and although these were only contributory causes, it is necessary for a complete understanding that they should be mentioned. The Institute at that time exercised little discrimination in admitting members; practically anybody who had the money was admitted to full membership, even if he had never seen a mine or a picture of a mine, I know this, because I myself was admitted to life membership at a very early stage of my career. The founders of the Mining and Metallurgical Society desired the association of a smaller number of more experienced and tried men—tried not only in professional work but also as to personality and character. Another thing concerned the method of government of the Institute. The origin and growth of the Institute had been largely due to the knowledge, genius, vision, and ideals of Dr. Rossiter W. Raymond, who became its first Secretary, and as such directed its affairs during a period when it became the intellectual mecca of mining engineers, and the most potent factor in the development of mining geology in the direction of its present practical usefulness. As a guiding and presiding genius, Doctor Raymond ruled supreme for years, and while many were satisfied with this beneficent one-man rule, there was naturally a growing feeling on the part of the independent-minded that they would like some more democratic form of government for a representative body of mining engineers—one in which they might have a part and be free to express an opinion. Therefore, the constitution of the Mining and Metallurgical Society as drafted was a very democratic one. It provided that all official ballots for officers should contain not fewer than two names; and that these names should be determined by a direct primary vote of all the members, giving the Council the right of nomination only when the primary vote did not result in as many as 11 votes for any executive office or in seven votes for a councillor. This was in contrast with the methods of the Institute, where there existed, and still exists, the practice of putting only one candidate for each important office on the official ballot, which is sent to each member with the grave request to vote for one out of one; where the succession of dynasty is determined by a very small and more or less permanent group; and where the membership at large has no direct vote in any matter of importance. Where, in other words, the form of government is that of a self-perpetuating oligarchy. Although provision is made for an alternative ticket at the instance of a certain number of members, such a rump ticket is rarely put in the

field, which is a pity when it is considered how largely this contributes to the joy of living, as in the well-remembered real election contest of Moore vs. Jennings.

The constitution of the Mining and Metallurgical Society was drafted with the manifest virtuous intention of substituting democracy for oligarchy in its government. Whether the form has always secured this desired result is open to reflection and discussion. We all know that the South American republics have beautiful constitutions, modeled along the highest ideals of the Pilgrim Fathers; but that too often it falls to the lot of General Garcia or General Diaz as President to direct not only the executive functions of the government, but the legislative and judicial as well, on the well-established principle that if you want to get a thing done well, do it yourself. It is natural in any such republic, as in any technical or scientific society, that the burden of work will be gladly left by the members to a small devoted band, who become familiar with the task and needs, who are too apt to help the good work along by direct methods when they see, or think they see, the society in danger (which, in fine, means when they see the society in the way of being conducted contrary to their own opinion, and in accordance with the opinion of someone else). Thus, our reformers may themselves develop into what others will call a clique—only it looks different when viewed from the inside from what it does on the outside. I am not boasting on behalf of the Mining and Metallurgical Society that precisely this has not taken place from time to time within its organization; indeed I myself, as an outsider, have made this accusation against the Society at times in the past; and it is very possible that some new outsider has had similar suspicions during my own administration. Surely, however, I believe that in the conduct of societies we should resist the inclination to form benevolent and self-perpetuating oligarchies, and should stand for the principle of actual democratic control, which, if it will not work in an organization of selected, educated, and cultured men, will surely not work in our municipal, state and Federal government. What we really need, I maintain, in societies, is a continual renewal of fresh blood to the heart, just as we do in our country's government; and I maintain that the society or country that is dependent for its guidance on any one man or any small group must eventually sink below normal—witness Germany and Mexico among nations, as compared with the steady progress, through storm and sunshine, of France and England and America.

The founders of the Mining and Metallurgical Society went further in their democratic constitution and provided that the

council should be subject at any time to a test vote of confidence by the members, on request of 20 per cent of the membership, or two-fifths of the Council; and that in case of an adverse vote the whole Council should resign, and give way to a newly elected body. This part of the law has never been appealed to, but it puts the whole conduct of the Society in the hands of the members at any time they may choose to exercise the control.

The constitution also provided that the Society could take no action on any matter of policy, except by a referendum or popular vote of its members, and this principle has been rigidly adhered to. This device has resulted, in spite of the constant small numbers of the Society (for the Society has never had more than a few hundred members) in the most representative expression of opinion which has been attained for the views of the American mining engineer, and the decisions thus obtained have always been accepted as important by the whole mining fraternity. It is a form of expression which is financially out of the question as an habitual form of government, in a great and numerous society, such as our American Institute of Mining and Metallurgical Engineers has become.

Let me proceed to sketch further the history of the development of the Mining and Metallurgical Society and that of its always closely allied associate and parent, the American Institute of Mining Engineers. The purposes of the Mining and Metallurgical Society were stated in its constitution as follows:

The Society shall have for its objects the conservation of mineral resources, the advancement of mining and metallurgical industries, the better protection of mine investors and mine workers, the increase of scientific knowledge, and the encouragement of high professional ideals and ethics.

The objects of the Institute, as now stated are:

To promote the arts and sciences connected with the economic production of the useful minerals and metals, and the welfare of those employed in those industries by all lawful means; to hold meetings for social intercourse and the reading and discussion of professional papers, and to circulate by means of publications among its members and associates the information thus obtained.

It will accordingly be seen that from the inception of the Mining and Metallurgical Society there was no intention to duplicate the objects of the American Institute or to set up a rival society, but rather to found a society which should supplement the work of the Institute and co-ordinate with it for the benefit of the mining industry. The objects of the Institute are



declared to be primarily technical studies, papers, publications and meetings, "to promote the arts and sciences connected with the economic production of the useful minerals and metals;" while the objects of the Mining and Metallurgical Society were stated from the first to be the discussion, determination and carrying out of questions of mineral policy on broad and national lines. In other words, the Institute was declared to be essentially devoted to the technology of the mineral industry, and the Mining and Metallurgical Society, to the determination of policies for the mineral industry. A consideration of the actions, meetings and publications of both societies shows that there never has been any real or important deviation from these chosen and separate fields, and that neither society has seriously invaded the field of the other. To recall and define anew the essentially separate and unique field of the Mining and Metallurgical Society, early in 1921, the Council passed the following statement of its sphere of activity:

The purpose of the Mining and Metallurgical Society of America is primarily to discuss, digest and take formal action by referendum of all its members upon those broad principles and questions which affect the mining industry, and which cannot be, or are not covered by other organizations; and then, so far as possible, to put their conclusions into operation.

It excludes from consideration technology, methods, detail and special interests, in order to concentrate more effectively its attention upon the fundamental principles and problems affecting the industry, such as labor relations, legislation, economics, and education, with which it may be competent to deal.

Its purpose and ideal is to establish helpful co-operation at the natural points of contact with other organizations.

As typical of its activities and accomplishments, may be cited its work respecting safety in mines, oil land and mine legislation, taxation, standardization and economics.

This was but a simple reaffirmation of what had been the consistent policy of the Society. As one looks back over the activities of the Society, one sees that it was one of the pioneers in the agitation of the mine safety question, now so thoroughly handled by the National Safety Council and the Bureau of Mines; and also in the movement for a revision of the mining law, also taken over later by the Bureau of Mines. Since its organization in 1908, the Society has expressed itself formally upon public questions as follows (and these are printed in the pamphlet which contains the constitution): on the protection of mine investors in 1909; on the appointment of State Mine Inspectors in 1911; on the develop-

ment of the Alaska coal lands in 1912; advocating a public building in Washington for geology and mining in 1913; concerning patent legislation in 1913; concerning oil-land legislation in 1913; concerning a revision of the mining laws in 1914, 1915 and 1916; on war revenue tax on professional incomes in 1918; on the necessity for labor to produce more in order to earn more in 1919; on the subject of licensing the mining engineer, on the subject of the college training of the mining engineer, and on the metric system, in 1921. These official actions grew out of meetings at which these subjects were discussed by the members, taking as the text the reports of special committees appointed for investigation of these problems. The bulletin of the Mining and Metallurgical Society has kept itself clear from technical matters, just as that of the Institute has devoted itself exclusively to technical matters. The two systems have worked efficiently side by side, and the same men have in many cases been prominent in the conduct of the affairs of both societies.

Looking backward over this record, it is a little hard to see why any impression of rivalry or antagonism should ever have gained ground. Certainly as a life member of the Institute for the last 20 years, and as a charter member of the Mining and Metallurgical Society, I was never personally aware of any conflict of field. Nevertheless, from hearsay I judge it probable that in some way the impression gained ground, and that a certain offishness, class feeling or provincialism developed not only among the members, but to some degree also among the governing boards of the two bodies. The Institute gradually modified its methods along some of the stricter lines which had been adopted by the Mining and Metallurgical Society. It raised the standard of full membership so that the stated requirements are nearly those of the Mining and Metallurgical Society, and it relegated to the outer darkness of "associates" those who did not have these qualifications. It changed its habit, if not its form of government, so that no one man, secretary or president, could control or dictate: established the actual government in the Board of Directors, as it practically resides in the Council of the Mining and Metallurgical Society. Except that the Institute directorate, through a nominating committee, still retains the habit of nominating the new officers, without appeal to the membership, the methods of government are very similar in both societies. Further, the Institute changed its name from "Mining Engineers" to "Mining and Metallurgical Engineers," so that the Mining and Metallurgical Society should not apparently

cover a wider field than did the Institute. I think this was an unnecessary change, and that both societies would be better off without such cumbersome names. It was originally, perhaps, a case of aping the British; and we are beginning to believe that in many cases our Yankee notions are well enough. The present designations of both societies are, as I repeat, cumbersome, and they make a false show of comprehensiveness; for a year ago a pure and simple geologist, Winchell (most geologists are pure and simple) was President of the Institute, and another, Lindgren, was President of the Mining and Metallurgical Society.

It is told that one day a president of the Mining and Metallurgical Society sought out the secretary and informed him that he was going to propose a resolution that all members of the Society should paint their noses green. When asked to explain, he observed that the Institute had adopted one by one most of the distinguishing characteristics of the Society, and he wanted to see if they would go so far as to paint their noses green also.

As I get the story, for I myself had no personal touch with the Society affairs at that time, the Institute having changed its requirements, constitution, habits, and name, so that they were equal to Mrs. Murphy's across the street, felt that the *raison d'être* for the Mining and Metallurgical Society no longer existed; and certain of the members and officers of the Mining and Metallurgical Society, led by the loyalty to the Institute which characterizes all good Mining and Metallurgical Society members, were led to dally with the same idea; all apparently strangely unconscious of the wide and fundamental divergence of fields. There were many negotiations looking toward amalgamation of the two societies, or rather toward benevolent assimilation of the smaller society by the parent organization. At various epochs, the controlling group of both societies desired a merging; but always some accident occurred to prevent the signing of the treaty. The last failure hinged largely, according to hearsay, on an afterthought in the Institute's offer, by which it proposed to erect a bronze commemorative tablet to the Mining and Metallurgical Society in the halls of the Institute. The Institute of Metals had requested such a tablet when they amalgamated with the American Institute of Mining Engineers, and it had been granted; the Institute naturally thought the Mining and Metallurgical Society should be no less ceremoniously honored. The impression, thought, association or connotation given to the proposal by the



Council of the Mining and Metallurgical Society was, however, quite different from the Institute psychology; to them it suggested something like another notch on the gun stock of the Institute, and it broke up the party, which changed from a birthday to a wake.

I fear I shall be thought presumptuous in discussing the Institute in connection with the Society, but the fact is that the two are so interwoven in everyone's mind, and in reality, are a part of the same problem, that I cannot discuss the Society frankly and effectively without a constant analysis of its past and present relations to its beloved parent organization. And although this is my retiring speech as president of the Mining and Metallurgical Society, please remember that a president is an ephemeral and really irresponsible individual; that the real governing and responsible body of the Society, the Council, have not seen or approved my speech, and certainly would not approve of it if I had submitted it to them. I feel in this my maiden presidential speech, like Tennyson's maiden:

If you're waking, call me early, call me early, mother dear,

For I would see the sun rise upon the glad New Year.

It is the last presidential year that I shall ever see,

Then you may put me on the Council and think no more of me.

So I am determined to have my last little fling of plain talk, and nobody is to blame but myself.

Moreover, I think I am safe in the spirit of frankness and good-fellowship now, because whatever mist and doubt and falsely-spread impression of rivalry existed in the past I think is quite happily over at present. There are few, if any, members of the Mining and Metallurgical Society who are not devoted members of the Institute, and you will find the same willing men in many cases working hard in both societies. Of the presidents of the Institute in recent years, Mr. Hoover and Mr. Winchell are among the members of the Mining and Metallurgical Society, the latter a member of the Council; the new President, Colonel Dwight, is chairman of the Mining and Metallurgical Society Committee on Ethics. The new President of the Mining and Metallurgical Society has long been prominent in Institute affairs. The Vice-president of the Mining and Metallurgical Society is chairman of the New York Section of the Institute; the Secretary of the Mining and Metallurgical Society is an active committee worker on the excellent Committee on Mining Methods of the Institute, and a contributor to *Mining and Metallurgy*. In the Council of the Mining and Metallurgical Society last year were the chairman of the Pe-

troleum Committee of the Institute and a member of American Engineering Council, the engineering representative of the Institute. The chairman of the program committee for this meeting is chairman of the Industrial Relations Committee of the Institute, and vice-chairman of the New York Section of the Institute. I could go on almost indefinitely, showing the brotherly and effective interwoven organization of the two societies. Does that look like cross purposes, members of either or both societies? Rather, it proves close co-ordination and unity of purpose, and if there remain any remnants of elements who look askance from one society to the other, it is time for them to wake up and see the light. There has even been formed during the past year a committee on co-ordination under the chairmanship of the Institute, made up of delegates, not only from the Institute and the Mining and Metallurgical Society, but also from the American Mining Congress, with the object of avoiding duplication and securing joint and effective action by the different mining organizations wherever possible. Finally a peaceful and friendly transfer of the Secretary of the Mining and Metallurgical Society to the Institute was made this year, the Society gladly seeing its Secretary put into a position of larger activity and equal honor.

I believe most heartily in co-ordination and co-operation. I believe that we should never forget Patrick Henry's famous fundamental apothegm, "United we stand; divided we fall." I stand and plead for the maximum fraternal relations and co-operation among all institutions representing the mining industry. And, therefore, the subject of the closer working together of the Society and the Institute is still one that should be studied and further adjusted.

It must be perfectly clear, I think, from the explanation I have made of the widely separated fields of the two societies that the younger society should not be permitted to languish. That would leave a wide gap in our mining councils in a field, the importance of which is now greater than ever before. Therefore, any plan of co-ordination with the parent society which involves abandoning of its field by the Mining and Metallurgical Society, or giving up the machinery which enables it to represent this field so well, is undesirable. On studying the subject, as I have this year, intensively and prayerfully, I find the mechanism of the Society exceedingly well adapted; its traditions and record excellent; its function of vast importance to the mining industry and the nation. What mining engineer does not desire to be of some public service, as a matter of duty

as a citizen and an American? He can find this opportunity in his own field, in the activities of the Mining and Metallurgical Society of America, and he may follow out the ramifications of his field into all the vast problems of public welfare. There is room for all; the past of the Society has only pointed the way; the Society needs red blood and plenty of it.

In seeking a plan for closer relations with our parent society, which should work out to the advantage of both, I believe that some plan of close association or co-ordination is far better than any plan of amalgamation, which would destroy the autonomy of the Mining and Metallurgical Society. Much, as I said, has already been accomplished by the activities of many prominent engineers working in both societies, and so obtaining a clear idea of the respective fields, and a high degree of respect and loyalty to both. And a most important official step has been taken in the formation of the joint co-ordination committee. Further rapprochement should be sought, but the tendencies should be like those of the nascent Association of Nations, already begun in Washington; a maximum of good fellowship and mutual helpfulness. And in this connection I may cite, as a possible precedent to be followed, the Society of Economic Geologists, organized somewhat over a year ago. Mining geologists have been bred up in two parent societies, neither of which has even a speaking acquaintance with the other—the Geological Society of America and the A.I.M.E. But mining geology has become a special geological science, a special branch of mining engineering; and to foster the growth of this special profession I had the honor to suggest to a group of mining geologists in Washington, 16 years ago, the establishment of a special journal for economic geology. This suggestion was acted upon, and the journal we then established has been for long the chief journal of its kind in the world, with a world-wide circulation. In the course of time, the growth of the profession indicated a further gathering together of the loose ends, and two years ago I suggested the establishment of a separate society, which has come into prosperous being.

Upon its organization, the question of its affiliation to its parent societies came up most urgently. Unlike the Mining and Metallurgical Society, which can trace only one parent society, the Institute, the Society of Economic Geologists had two visible parents, and to that degree was most respectably started in life. On the one hand it had the Geological Society of America, and on the other, the Institute. There were among the founders of the Society those who thought this new child should cleave to one parent, and others who thought it should



make its home with the other parent. Between the two stresses it was evident that the child should strike out for itself; but it adopted the custom of joining annually with each parent at its respective annual meeting. Some form of affiliation was earnestly sought by the Geological Society of America, and ended in the device of exchanging ambassadors; each society names its delegate to sit upon the council of the other society, provided only that the delegate shall be a member of both societies; he takes part in the deliberations of the council but has no vote in it. Such an arrangement, or in fact any form of arrangement, has not yet been sought by the Institute, but it would be good policy for it to welcome some formal co-ordination. And I mention the example of the Society of Economic Geologists and its experience, as, perhaps, furnishing an analogy which may aid in solving the problem of the co-ordination of the Institute and the Mining and Metallurgical Society. I think the Mining and Metallurgical Society could well afford to meet with the Institute once a year, as the Society of Economic Geologists did so successfully at Wilkesbarre last summer, and as I hope they may again next summer. And the existing device of a co-ordinating committee, possibly furthered by the plan mentioned, of an exchange of delegates or ambassadors to the respective councils, and regular annual meetings held together would, I believe, work out finally into as satisfactory a plan of mutual helpfulness and mutual strengthening as could be desired.

The Mining and Metallurgical Society, as I visualize it, does not aspire to large membership, like the Institute. It does, as I understand it, desire the membership of men in the profession who are interested in studying and attempting to solve the policy problems of the industry. The test for admission is whether the candidate can help the Society; it is not at all the idea that election confers any honor or distinction on the individual. Service to the industry and the country is the dominant note; it is not what you can get, but what you can give in spirit and willingness to aid, which determines whether you want to be a member or not. Nevertheless, we all recognize that there are many men now outside the Society which it needs for carrying on its important work. We acknowledge our inadequacy, our halting and stumbling footsteps in our chosen path, during the past, and we pray for greater strength and light and vigor in the future. In this we need the help of every member; we need the help of new members; we need greater enthusiasm and devotion on the Council and among the officers. Do not let us forget that if a thing is worth doing at

all it is worth doing well; and the work of the Society is wonderfully worth doing. I see dimly a vision of its possibilities, as great and glorious as one could wish to visualize. "What constitutes a state?" asked the poet, and answered finally, "Men." What constitutes a society? Men—the quality of the men that compose it.

Now, one of the troubles the Society has had in the past has been in its machinery for selecting members. In the endeavor to throw a safeguard around the membership, the organization leaned over too far backwards, and fell down. The constitution at first provided that a small number of adverse ballots from the membership constituted a blackball which the council could not overcome; and so for a period many desirable men, who happened to find a few members who had some little dislike to them, were denied entrance into the Society. This disgusted their proposers and backers, who concluded that the Society was run by a narrow, self-righteous, pudding-headed clique, and sent in their resignations. Now, I want you to clearly understand that that dangerous regulation has long since been remedied. At present the Council has the final decision as to membership, after considering any objections presented in writing by members; and it, therefore, becomes unlikely that any candidate for membership will be rejected out of petty personal dislike or rancor.

The Society has been at times accused of various delinquencies, as, that it is a high-brow society; that it is a New York club; that it is pompous and dull and tending nowhere in particular; that it is a movement of secession from the Institute; and that the Institute could do all that it is doing. The utter misconception and misinformation concerning the Society as at present organized as antagonistic to the Institute I have already fully exposed. During the past year the Society has disbanded its special committee on co-operation with the Engineering Standards Committee, on the officially stated ground that the standards under consideration related to the technique of mining, and not to its policies; hence, it left the mining engineering representation to the Institute. It also declined the invitation of the Bureau of Mines to be represented among the various societies in its drill-steel committee, and for the same reason, pointing out that this was the field of the Institute. And in a number of other instances during the past year it has pointed out that it could not take part in any technical studies, since that field was already adequately covered. This clear definition of respective fields it is advisable to hold in mind. The problems of technical

standardization, for example, which the Society relinquished, fall more into the field of the Institute than that of the American Mining Congress, under which they have been most actively studied.

Now, as to being a high-brow society—heaven knows we would like our brows to be as high and our hearts as big as God will let us. As to its being a New York club—it is true that there is a vast concentration of mining men in New York. This is true of the Institute membership as well as that of the Society. Nowhere, except in New York, can the Institute turn out anything approaching the attendance at its section meetings that it does here. And with the vastly smaller membership of the Mining and Metallurgical Society, the same proportion comes out more strikingly. Moreover, since the concentration of engineers in New York is pre-eminently of the policy men of the industry, and since this is the key to the Society's membership, it is natural that the relative preponderance should be somewhat more exaggerated in the case of the Society. But even the Institute has had trouble in keeping its sections alive, except in New York; and, of course, the problem with the Mining and Metallurgical Society has been much greater. Efficiency, however, is not so much a question of numbers as of spirit, and I hope to see the time when, if only two or three members of the Society are gathered together in any part of the country or the world, they will hold a meeting and discuss the problems of the Society and of the industry, and send in a report to the Secretary in New York for the information of the Council. That's what we are here for. As to the dry, pompous and dull accusation, it may be that we have been a trifle dry since the Eighteenth Amendment, but the fact remains that there has never been time at any of our meetings this past year for all those who wanted to get into the discussion. As to whither we are tending, we are purposely plodding along, and we can do wonders with everybody helping. It takes a long time to carry a movement to its ultimate end, if that ever comes. The Society's movement for a reform in the mining laws is still being agitated, after seven years; but in any event the influence of the effort is widespread and crops up in unexpected places. The Society has nothing to complain of in the willingness of its members. In response to a letter sent out this year by the President and Secretary concerning the licensing of engineers, over half the membership sent in extended letters dealing with the subject, and the result of this symposium has powerfully affected the engineers of other groups. It would have been difficult to arrive at such a valuable



expression of opinion through any other machinery than that of the Mining and Metallurgical Society.

The investigations concerning the education and training of the mining engineer initiated by President Knox have borne fruit in my administration, in a series of three committee reports which have been printed in the bulletin of the Society, and have in some instance been subject to such a demand from the outside that the Society has been unable to satisfy it with its limited funds. One mining school president wrote that he would make the study of the report of the Committee on Technical Education a prescribed course for his faculty. The president of the School of Mines at Camborne, Wales, suggested to me that mining educators would be much interested in a referendum of the Society on the principal points of mining education, such as the length and character of the course. Such a referendum has been sent out, and the returns from it will no doubt be carefully studied and will prove very influential in the future classification and standardizing of mining education.

A Committee on Mine Taxation has been active during the year, keeping in touch with the taxation situation. A Committee on the Ethics of the Mining Profession has been organized, and it is believed that it will prove to be of great value in determining in many cases for each of us what we should and what we should not do, under certain circumstances. If any of you have a specific problem along these lines, send it in, and the judges will try to see that you get an answer, either directly from them, if the case is simple, or through a referendum of the membership, if the problem is a puzzling one. The committee is on the job to serve.

One of the most ambitious enterprises during the past year has been the formation and initial work of a Committee on Foreign Mining Policy, consisting of Messrs. (or shall I say doctors, as is the present courteous fashion?) Leith, Bain, Smith, Yeatman, Ball, Veatch, and Manning. This committee has submitted a preliminary report, intended only as a statement of basic principles, which has aroused great interest and attention. The establishment of a proper mineral policy for exploitation and conservation, at home and abroad, for international trade in minerals, and the determination of the consequent necessary government measures and agreements, is in the end a management problem; it aims at the most efficient management of raw materials on which our prosperity and wealth have been mainly based; and it is a subject not to be handled with the best results except by those familiar with the laws and engineering data of

ore occurrence, and the facts pertaining to the conditions of beneficiation and consumption of the metals and mineral products. It is a clear responsibility laid at the doors of this Society, for the Government bureaus are essentially fact-finding bureaus, and cannot well officially champion strongly any national policy or movement. This subject of and by itself is a sufficient warrant for the existence of the Society and your support of it. These problems are of vast and fundamental importance—the recognition of the approximate facts concerning the geographic and quantitative distribution of each mineral product, and how we should manage it for the ultimate greatest advantage of everyone in the nation. The ramifications and applications of this subject, it will be at once recognized, are numerous and weighty. Therefore, two meetings of the New York Section have been devoted to an animated discussion of this matter, and the program committee has judged it should form the keynote for this, our annual meeting.

For the future I see in my mind's eye the destiny of the Society as a fair and lofty structure which we may rear.

We need, as I said, enthusiasm; we need the contribution of work; we need intelligent guidance; and we need money. A society with a limited membership and small dues is naturally very poor, with all the limitations of usefulness which that implies. I doubt whether we should try to remedy this by increasing the dues; but I do believe that the Society should secure, from time to time, endowments from those that can afford it, that it may thereby eventually secure a proper and dignified home, and be established upon a basis not to be shaken.

**W. R. Ingalls.**—It is unnecessary for me to say anything in eulogy of the incoming President. The fact that you have just elected him President shows in itself what you think of him. Moreover, the incoming President has got his future before him; he has got to make his record. I shall therefore merely ask Mr. Rogers, our incoming President, to tell us what he is going to do.

**Allen H. Rogers.**—It was with considerable diffidence I allowed my name to be used. It is a hard task to follow such a distinguished predecessor. However, one thing I can bring to the office and that is the desire to advance the interests of the Society, and these, as we all know, are predominantly the interests of the people engaged in the mining industry.

It seems to have become the custom that the new President shall give his views of the Society's future. In the short space between election and induction into office it is difficult to formu-

late anything very precise, but having been a member of the Society since its beginning, I may naturally be supposed to have some ideas on the subject.

In common with many incoming Presidents, I have scanned our record, which now covers 14 years, and I believe no one can say that it is other than creditable as far as we have gone. I say "as far as we have gone," because I believe the field of our endeavor to be as yet but scratched. It was somewhat amusing to me, in view of what has been done since, to read in the Secretary's report for 1915 that some of the members felt that the field of usefulness for the Society had been pretty well covered and that therefore its reason for existence was gone. What was not so amusing was that some of those members resigned their membership, and it is a source of regret that others have since done so for the same reason. Now, as I said before, I believe no one can say with truth that the record of the Society has not been highly creditable. Personally, I would say more. It is my opinion that the Society has been and can and will be a powerful influence for good, for advancement of the profession and the industry. Believing this and recognizing this feeling that the Society no longer serves a useful purpose, I have tried to think what can be the explanation. We have to face the fact that some of the most prominent engineers of the Society have resigned, and although the membership is now larger than ever the growth is very slow. There is little difficulty in maintaining the interest here in New York, where about 40 per cent of the present membership is domiciled, and it is possible to have meetings which offer considerable social attractions. Experience in all organizations goes to prove that the social feature is very important in keeping up interest. The growth of the interest since local sections were formed proves this. It may be said that in an organization with a serious purpose such as ours, such a consideration should have no weight. That there are social advantages in addition, however, interferes in no way with the accomplishment of the purposes of the Society, but it will make its realization easier. Indeed, in these Volstead-ridden days interest is more keen after a good dinner with the accompanying stimulating conversation. Furthermore, there is no discussion equal to a verbal one. Opposing arguments bring out thoughts which may never be brought out by correspondence, and although some unconsidered or even ill-advised action may sometimes result, the procedure for consideration of a subject by the Society as a whole is such that no harm can result.

All this was embodied in the original plan of formation of



the Society, although the social feature wasn't mentioned. Besides the New York Section, two others were formed and were active and successful. As I see it, the future of the Society and its usefulness depends on reviving these Sections and the organization of new Sections in the same way, so that not only may more members have the social advantages enjoyed by the New York Section, but new members will be attracted to our ranks. Mr. Spurr has been referring to co-operation and co-ordination, and it seems this also must mean reviving the old Sections in Philadelphia and San Francisco and creating new ones. I would suggest general meetings with the other Sections, choosing for the subject of discussion at these meetings one of the questions under consideration by the Society, for example, the subject of foreign and domestic mining policies. Such a meeting would bring engineers outside our ranks to realize that the Society is still a living force. If this succeeds in reviving interest in the Society in San Francisco and Philadelphia I would follow up the same suggestion in other places.

It seems to me that we should in this way stimulate interest in the Society and add substantially to our membership from regions where we are barely represented. It is an anomaly that the Mining and Metallurgical Society of America should have but one member in Nevada, two each in Idaho and Montana, eight in Utah, ten in Colorado and none in New Mexico, all states in which the principal industry is mining. The reasons for desiring an increased membership are two. Although at the present time the influence of the Society is great, it would be much greater with increased membership. That is the first reason. The second is that the increased revenue resulting would permit the Society to do things which its limited resources now prohibit. It seems to me there has been hitherto a reluctance to admit that we need new members, and I am sure some of our members are honest in believing we do not, but I believe that while we have done well we can do better with a larger membership and I for one hope to see the Society grow very rapidly.

As to work for the coming year, I believe we have all we can properly attend to in concluding what has already been started. We must have further discussion on technical training and post-graduate training and technical education. We have the very important question of foreign and domestic mining policy to discuss. Our Committee on Standardization has never completed its work. In this connection, Mr. Spurr has expressed the view that co-ordination should be carried out to the end.

that agreement on this subject among the various mining organizations may be reached. Our Committee on Economics has never rendered any formal report. From time to time we have had valuable papers on this subject from its chairman, Mr. Ingalls. These papers have had an important bearing on the relations of labor and capital. There is no man who in my conception is so competent to study and pronounce on this question as the engineer. He occupies a position between the two and without bias understands the problems of each. I have therefore been hoping that we might soon hear something on this important subject from our Committee on Economics, and incidentally wondering whether it would not be worth while for the Society to take up by means of a committee on industrial relations this important subject. I am sure the mining industry, if not industry in general, would be glad to hear an expression from the Society on the subject. This is a time of stress for all professional organizations and I think the members of the Society may congratulate themselves that it is coming through it with less difficulty than most of the sister societies. Good times will come again and we should try to convert more of our brother engineers to the belief that the Mining and Metallurgical Society is of all the societies of the mining industry best qualified to discuss and pronounce on those large questions which lie outside the realm of technique and are so important to the mining industry.

**Sir John Cadman**, President of the Institution of Mining Engineers of Great Britain, was present as a guest of the Society and spoke interestingly regarding his experiences during the late war in connection with the supply of petroleum and its products to the Allied armies.

**W. R. Ingalls.**—We now come to the presentation of our Gold Medal. The Gold Medal for 1921 was awarded for distinguished service in the promotion of safety in mining. I am glad to say that many years ago I myself had a little to do with starting a movement in that direction which subsequently swelled. Doctor Holmes, the first Director of the Bureau of Mines, took it up, and after him his successor, Doctor Manning. It is, therefore, very fitting that in starting the functions leading toward the presentation of our medal on this subject Doctor Manning should make the first address.

**Van. H. Manning.**—I am called upon to speak tonight as a substitute for our friend, "Big Ben" Thayer, who is unavoidably absent from this meeting.

Some years ago, I came across an article entitled, "A Corner in Ancestors—the Manning Family." Glancing over this article, I found that Thomas Manning was one of a Council of Safety in 1775, from which you may conclude that the Mannings' interest in "Safety First" dates back for three centuries; but it was not until 1910 that the present generation of Mannings took an active interest in the slogan of "Safety First."

At about the time I became Director of the Bureau of Mines, with some 40,000 mines safely anchored on the slopes of the Rockies and the Alleghenies, I made my acquaintance with Charles Warren Goodale, and identified myself with the growing army of rescue and first-aid men, an army which marches forth not to annihilate and destroy but to conserve and cherish.

Never has this country had greater need of the services of men qualified to apply the teachings of science to our everyday life. As man's command of the forces of nature increases—as his activities are multiplied and civilization becomes continuously more complex—there is an ever-increasing need of men who can see the best way to do things and are skilful and courageous enough to make their visions come true. Foremost among those who have shown this ability to see and to do, I place the American mining engineer. Inheritance, environment, and education have enabled him to grasp firmly the hand of opportunity and to achieve success wherever she might show the way. Chiefly to inheritance and environment is the credit due, for they have given the American engineer his characteristic traits—alertness of mind, initiative, ingenuity, practicality.

These traits are exemplified by the splendid achievements of our honored guest to whom the Mining and Metallurgical Society is to bestow its medal this evening.

In the hall of fame of this Society, there are before you pictures of distinguished engineers whom the Society has honored in recognition of distinguished service in various branches of mining and metallurgy, and tonight it proposes to distinguish the service of an engineer for the things he has done in increasing the safety of men in mining and metallurgical operations.

The recipient of this medal stands before you tonight as the example of the rewards that follow human deeds, and it gives me genuine pleasure to attest, at this juncture of his life, to the great and wonderful accomplishments in his efforts to create safe and efficient methods in the mineral industry. Safety and efficiency must necessarily go hand in hand, not only as regards individuals but as regards the nation itself. Individual



efficiency insures individual safety; national efficiency means national safety.

We honor this man who has driven death away; who has made his triumph in civilization—a man whose name will go down in history and leave its impression upon a community as a savior of mankind—a provider for families; a man who rendered public charges negligible; and a man who relieved sufferings and privations, which cannot be measured by words or compensated by money equivalent.

This audience, composed of individuals interested in many lines of human endeavor, have come together to acknowledge the things done by one man, and it has happily been suggested: "Let us balance our praise of war heroes by pausing to honor a hero of peace."

And we have with us tonight an engineer who has been signally honored as a peace hero, an honor bestowed upon him because of what he has accomplished; a man who has been a leader and inspirer of thousands of his contemporaries, and, from an inborn conviction, engaged in a work to develop a service to others, to advance a most worthy cause—all of which have been the dominating characteristics of his character. This man has been persistent in his labors to improve and to build up agencies for the promotion of health and happiness among his fellow-men. His zeal in this great work of increasing the safety of men engaged in mining and metallurgical operations has become an obsession with him. His energy and singleness of purpose have brought about results of large undertaking. That he has been successful is evidenced by the great work, of which I have personal and intimate knowledge, done by him in connection with the Anaconda Copper Mining Co. and its subsidiaries.

Those of us who had the privilege of laboring with him for the benefit of the great mining industries and for the safety and health of millions of mine workers, know how absorbed he has always been in his work, and he is justly entitled to this encomium:

He who does the best his circumstances allows,  
does well; acts nobly;  
Angels could do no more.

**James F. Kemp.**—In the class of 1875 in the Massachusetts Institute of Technology there came under the instruction of Professor Richards a young man named Goodale and by that very process he was started straight away on the course which inevitably led to the Gold Medal of the Society. After about ten years' engineering experience he migrated to Butte and settled there in

1885. It is my purpose to tell you something about his life in Butte. I have been going to Butte for 26 years at short intervals and on my first visit came into very pleasant relations with Mr. Goodale. He was then attached to the Colorado Smelting & Mining Co., in charge of the mining operations just west of the Anaconda operation. We went underground together and it was evident to a visitor that he was on very cordial and delightful terms with his men. I remember as we were going through one of the drifts where the green stain of copper was shown on the walls he said to me, "You see, copper hangs out its flag everywhere," and I couldn't help replying, "Then copper is an Irishman." Then we went over to the Nettie. It was a very fine silver vein, but it was fearfully broken up by a large fault in one place and a large dike in the other, which gave the manager much trouble to find out what had become of it. He explained these difficulties to me and then said, "They call this mine the Nettie; they ought to call it the 'Painted Jezebel.'"

Before I follow Mr. Goodale's further work in connection with the mining and smelting industry, I want to tell you something about his human side. In Butte many of us have enjoyed the hospitalities of the Silver Bow Club. He was one of the early founders of it. You remember behind the counter where now you could probably find sarsaparilla and lemon soda, there is a large shield and on that there is an inscription which I learned from Mr. Goodale was brought from an inn in London called the Cheshire Cheese. As he is the only man whom I have ever known who knew how the inscription came into the Silver Bow Club, I imagine he brought it himself:

If it be true, as I do think,  
 There are five reasons for a drink.  
 Good friends, good wine, or being dry,  
 Or lest we may be bye and bye;  
 Or any other reason why.

Down in the valley below Butte is the Butte Country Club, where many of us who have had the good fortune to visit the city have enjoyed a game of golf. I have been around a number of times with Mr. Goodale and I must confess to you he is strictly human and when he gets in a sandy bunker the same fireworks prevail that do with the ordinary man. He is also a devotee of the ancient Scotch game of curling. I know that because he has shown me his curling iron himself. You know,

they play it on the ice with a stone something like the shape of the shades we have around the lamps and project these things around the ice while a man sweeps the snow away in front of them. Mr. Goodale has repeatedly gone with the Butte team to a gathering of contestants at Quebec and has ably represented his home state.

Now, some years after my first visit when he was associated with the Colorado Mining Co., the directors of the Boston & Montana, one of the two large companies in Butte, thought that he had been under the influence of those ladies, the Nettie and the "Painted Jezebel," about as long as it was safe, and so they brought him over to be general manager of the Boston & Montana. The Boston & Montana mines are at the east end of the Anaconda Lode. In these properties the vein tails out into stopes that are three or four hundred feet across, so that with increasing depths there was a very fine opportunity for the business of a mining engineer. In order to avoid troubles with the owners of surrounding land, a very tall chimney was erected on the top of the neighboring bluff and a wonderful series of dust chambers were installed under Mr. Goodale's management. So successful was he that only a small curl of white sulphur smoke went over the top of the chimney. Now, it was so small that a rancher one day in visiting the works remarked to his friend, "Bill, do you see that big chimney? If they had built it ten feet higher, there wouldn't have been any draft at all." In this construction of the dust chambers, safety-first was illustrated, because all danger of suit from surrounding land owners was avoided.

Now, a few years later, on account of the danger of apex litigation which proved such a blight upon the camp of Butte, it became not only desirable but probably necessary to combine the large companies in one central organization. Great economies, as we can understand, could be thereby introduced, and the Boston & Montana and the Anaconda and a number of smaller enterprises were brought into one company. At the same time electric current was introduced for haulage in the mines and on the surface for the running of air compressors and the hoisting of the cages.

If we picture to ourselves in these vast underground workings whose extent now amounts to something like 2,200 miles, the introduction of live wires for underground haulage, we can



see that there was great danger to the miner and that safety-first became a very important feature of the enlarged company's work. As the mines at Butte get deeper the ground is increasingly hot and in the dead ends of drifts it is necessary to give the men air or else it is impossible for them to work with any comfort or with any efficiency. In these later years ventilation has been practiced to a remarkable degree, and safety-first has again been carried out. In the earlier days in Butte almost all the miners were Irishmen. There were a few "Cousin Jacks," and a sprinkling of other nationalities, but as time has passed the nationalities have changed and we find all the southeastern peoples of Europe, many of them unable to speak English, employed of necessity in the mines. It becomes a very difficult problem to maintain proper precautions for safety with so diverse a series of people and with such careless men, unable to speak the language of the country where they are necessarily employed.

The difficulty for the man who has charge of the safety-first work is of the very first magnitude. With the consolidation of the mines in later years, all these various lines of safety-first have fallen to Mr. Goodale and very successfully and admirably has he carried out the heavy responsibility of his position. With this line of work, however, he is also behind the general welfare work under the huge centralized company. Now, within the last year, with all the large mines practically idle and only the smaller silver mines in operation, with fifteen or twenty thousand men thrown out of work with families necessarily in need, the welfare work has become an operation of the very first magnitude. It has been said by one of the local observers in Butte that the way it has been carried on in the last few months would give even Herbert Hoover points.

Now, with all these various lines of work, the Society has never taken a more admirable step than when it decided to confer its medal upon Charles W. Goodale, the best loved man in Butte.

**J. E. Spurr.**—I want to call the attention of the members of the Society to the fact that the medal of the Society was established, according to the rules, for conspicuous professional or public service; for the advancement of the science of mining and metallurgy or of economic geology; for the benefit of the conditions under which these industries are carried on; for the protection of mine investors; and especially for the better pro-

tection of the health and safety of workmen in mines and metallurgical establishments.

I note that the medal has been awarded seven times before this year; first to Herbert Hoover, and subsequently to Robert H. Richards, James F. Kemp, E. P. Mathewson, Pope Yeatman, Charles Eugène Schneider, and E. A. Cappelen Smith. In looking over these awards I note the first was for giving publicity in English to a classical work in mining; that thereafter four awards have been made for metallurgical achievements, one for the advancement of the practice of mining engineering and one for the advancement of economic geology. In view of the broad field of the Society and the provision of the rules, it is therefore particularly fitting that this year the medal should be awarded for services in welfare and safety work.

Charles Warren Goodale, mining and metallurgical engineer, by authority of the Council and in accordance with the judgment of the Mining and Metallurgical Society of America, and in the name of the Society, I hereby confer upon you its Gold Medal for signal services in furthering the welfare and safety of workers in the mining and metallurgical industries of America.

**C. W. Goodale.**—When the members of the Council were asked to make nominations for the award of the annual medal of the Society last year, I presented the name of Benjamin F. Tillson, and felt most strongly that he should be given the honor, for he was the man who gave me my first lessons in safety work. Furthermore he was, and is now, the very active and efficient chairman of the Mining Section of the National Safety Council, and is recognized as the leader in the discussion on safety and welfare of the American Institute of Mining and Metallurgical Engineers. When some of you voted for Mr. George S. Rice, you tried to confer the honor on a man who shared with his former chief, Dr. Joseph A. Holmes, the distinction of inaugurating safety and rescue work in our mines, and I am sure your judgment was excellent when you expressed yourselves in his favor.

However, you have conferred the honor on one who has only had a small part, comparatively, in trying to reduce the hazards of mining, and I thank you most sincerely. Also I appreciate the kind words of the previous speakers.

In the early part of 1914, Mr. C. F. Kelley, then vice-president of the Anaconda Copper Mining Co., placed in my hands

the organization of the Bureau of Safety covering the metal and coal mines and all other operations of the company, including reduction works and saw mills. Authority was given to spend any amount of money required to make working places as safe as possible. Starting under such favorable circumstances was a great advantage, for it is found that no matter what the general attitude of labor toward the employer may be, the individual workman is inclined to follow the lead of the higher officials.

The first thing to do was to ascertain by careful study the causes of accidents in our mines and works, so that we might be able to attack the principal causes first.

The co-operation of bosses and foremen is needed in safety work, and one of the purposes in safety organization is to keep these bosses and foremen from catching the disease of carelessness from the men themselves. Safety rules cannot be enforced unless there is a desire on the part of all the men, as well as bosses, to obey them. A notable illustration of this is an accident which occurred at one of our mines where a man was fatally injured by breaking three safety rules at once. The station tender had loaded some tools on the cage upon which men were to ride, thus breaking one safety rule. He got on the cage and signalled to lower without shutting the safety doors on the cage, another infraction of the printed rules. He saw a chance to kick at a man passing the shaft, thus ignoring the rule against fooling or horseplay near the shaft. Just as his foot went out the cage was dropped and he was dragged through the bonnet of the cage, with fatal results as before stated.

A great many systems of giving bonuses to foremen and bosses for low accident rates have been tried and some I believe are still in effect. The theory on which bonuses are given is that the hope of reward is a greater incentive to carefulness than the fear of punishment, for a shift boss or foreman may be willing to take some chance that in case of accident, blame will not be placed upon him in any investigation which might follow such an accident. If a foreman or shift boss has in prospect a reward in the line of increased earnings, he will not only instruct his men in safe practices, but where he sees some work being done in a careless way, he will stay long enough to see that the unsafe practice is corrected. Our officials have held that it is just as much a part of the foremen's duty to prevent accidents as it is to keep the property under his charge in working order.



and we have discontinued a bonus system which had been adopted prior to the organization of the Bureau of Safety.

From the knowledge we have gained in regard to the causes of accidents, we may say definitely that accidents mainly are not caused by dangerous places, or defective machinery and material, but by the attitude of the individual workman. A close inspection of 500 accident reports shows that not more than six could have been charged to defective tools or material even by a liberal mind. Another illustration of this is found in the fact that repair men and those who work in places where the hazards are unusually great, are seldom injured. Mines which have excellent physical conditions with regard to character of ground have just as high an accident rate as those having more adverse conditions. The particular inspection of accident reports above mentioned led up to the thought that if so large a percentage of accidents could be attributed to carelessness, some scheme which would cause the men and bosses to give accident prevention intensive thought for a comparatively short period might result in some reduction, or at least would prove whether carelessness was a large factor. Accordingly, arrangements were made whereby all the mining companies of the district would co-operate; a public bulletin board, showing the standing of the mines, or the comparative accident rate per 10,000 shifts for each mine, was placed on the front of one of the largest theaters. A prize of a large safety pennant was provided, and the "no-accident drive" staged from July 17 to Aug. 14, 1920, four weeks. Each morning all the mines reported to a central office the accidents and shifts of the day before and computations on the basis of 10,000 shifts were indicated on the bulletin board. Our total accident rate per 10,000 shifts for July 17 to Aug. 14, 1919, was 23,499, while the rate for July 17 to Aug. 14, 1920, was only 9,114, a reduction of 257 per cent. After we had guarded the machinery and followed all the rules of safe practices, we must still carry on a constant propaganda to keep the individual workman on the alert to prevent accidents.

Our hospitals are under contract to furnish medical care to all sick and injured employees, so we are able to keep a record of illness as well as of accidents. From January, 1917, to December, 1921, five years, we found that the number of cases of illness was 23,839 and of injuries 15,014, a total of 38,853, showing that cases of sickness amounted to 61.37 per cent and accidents only 38.63 per cent of the total.

Another interesting feature of this study is that on a basis rate per 10,000 shifts, we find that generally the accident rate follows the sickness rate. When sickness rate goes up the accident rate also goes up. We also find that the months of the year can be reduced to a known relative hazard. The average sickness rate for March is nearly 100 per cent greater than for July, the lowest month, while the accident rate for April is approximately 50 per cent higher than that for September, the lowest accident month. In the bulletins of the Society may be found many references to efforts made by employers to improve working conditions. This subject was quite fully covered by Messrs. Tillson, Mitke, and Easton in Bulletin 149, "Vocational and Occupational Training," and I am sure you do not wish to bear any more on that topic at this late hour.

# Mining and Metallurgical Society *of America*



## DISCUSSION OF REPORT ON FOREIGN AND DOMESTIC MINING POLICY

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# Mining and Metallurgical Society of America

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## REPORT OF COMMITTEE ON FOREIGN AND DOMESTIC MINING POLICY

### STATEMENT BY THE CHAIRMAN OF THE COMMITTEE

**C. K. Leith.**—The preliminary report on the principles relating to the international disposition of minerals, prepared by the Committee on Foreign and Domestic Mining Policy has brought out some interesting comments, criticisms and papers, which will be helpful in future revision of the report. Also a considerable amount of work has been done by the Government bureaus and others touching directly and indirectly the field covered by the Committee report. Sub-committees are being appointed to investigate the international relations of specific minerals. It is proposed to present a revised general report summarizing the status of the problem—I hope within the present year. In advance of this proposed revision, we may review certain salient features in the discussion to date.

*Classification of Minerals of the United States in Regard to Supply.*—As was anticipated, the attempt to be specific and classify the minerals of the United States in relation to their adequacy of supply has presented a good target for criticism. The minerals of the United States were tentatively divided into four broad classes: (A) Minerals available in large quantities for export; (B) minerals of adequate supply but without great excess or deficiency; (C) minerals in inadequate amounts; (D) those almost entirely lacking. Some commentators accept this classification but think certain minerals should be taken out of one class and included in the other. For instance, gold, now put in Class B, is thought by some to belong in Class A, and by others to belong in Class C, because of the deficit caused by demand for the arts. In Class A it is suggested that helium be included as a mineral in which the United States has almost exclusive control. The principal criticism comes in regard to

the minerals named in Class C, supposed to be in inadequate amount. Ball clay, kaolin, corundum, garnet, and certain grades of graphite are thought by some people to belong in Class B. Others would add chromite, mercury, tungsten, and manganese to the list to be transferred to Class B. As for the Class C minerals, which seem to be lacking almost entirely in the United States, question is raised about cobalt. While small in quantity, it is thought to be adequate for our purposes.

Some of these suggestions are based on extensive knowledge and an impartial attitude; others come from parties interested commercially in one or another mineral, who are anxious to forward some cause. The changes in a revised report may not be as numerous as indicated by the above list, because many of the arguments and data brought up have already been carefully considered in classifying the minerals in this report.

A second group of comments on the classification of minerals calls for additional subdivision. For instance between Class B and Class D a subdivision of minerals of doubtful supply and high cost, which might be developed by an experimental tariff, and another group of minerals, the quantity of which is known to be adequate, but which are retarded by high costs.

*Tariff.*—The Committee report is not explicit on the subject of tariffs. The purpose is essentially to state the facts of supply and to indicate how these might affect international relations. It was recognized that this statement might serve as a basis for consideration of the tariff question, but it was emphasized that this consideration also involves many economic considerations other than those relating to supply. Notwithstanding the obvious intent of the report to draw only such simple inferences as might arise from consideration of available supplies, the comments brought forth indicate that the report is regarded in general as a free-trade document. So far as it favors in general the recognition and preservation of the main channels of international mineral movements clearly fixed by nature, this is true, but it is not true in regard to all minerals. Several of the minerals mentioned, particularly in Class C, those inadequate in the United States, have been the subject of vigorous tariff discussion in Congress, and advocates of the tariff on particular minerals have been quick to pounce on any failure to support their contention, even though this failure is one of omission rather than one of commission.

The Committee will doubtless hold to its original position, that it will touch the subject of tariff only through its statement of facts about mineral supplies, and will not go into a tariff



discussion which involves consideration of many other economic factors.

My personal point of view is that the stated facts about supplies in some cases suggest possibilities for the reasonable application of tariffs, and in other cases for free trade; in short, that so far as supplies affect the tariff question, they argue both ways. For instance, for the Class A minerals, the available supplies suggest that the tariff is harmless, but probably not necessary to protect these minerals. A tariff for revenue would probably not be highly productive. For Class B minerals, the question of supply does not essentially enter. Tariffs may or may not be desirable, because of high mining costs, fostering of domestic industries, etc. Tariff for revenue only would probably be useless, but tariff for protection might be desirable. For the Class C minerals, if the statement of supply is correct, restrictive tariffs in general are not desirable, but they are permissible to minor extent—to retain nucleus of industry for war; to insure careful search for new supplies; to extend reasonable use of low-grade supplies; and for revenue. As a matter of fact, the arguments for a tariff on minerals of this class which have played a large part in the discussions in Congress are based on the contention that the supplies in this country are really adequate. If the committee is right in its statement, this is not the fact. Tariff may be desirable for other reasons, but not for this reason. For the minerals of Class D, tariff for protection can do no possible good. It is merely a question here whether one for revenue might be desirable.

*Nationals of Other Countries.*—It is clear from the comments received that the treatment of nationals of other countries in regard to the exploration and ownership of mineral resources will require further investigation and consideration of specific laws and practices.

The above are merely my personal comments and not the considered statement of our Committee.

## DISCUSSION AT MEETINGS OF NEW YORK SECTION

Harvard Club, New York City  
November 22, 1921

This meeting was called for the purpose of discussing the report submitted by the Committee on Foreign and Domestic Mining Policy, Dr. C. K. Leith, Chairman, which has been pub-

lished as Bulletin No. 151, and distributed to the members of the Society.

After calling the meeting to order, Mr. C. M. Weld, Chairman of the Section, announced that owing to the enforced absence of Dr. Leith he had secured Dr. Bain to come in his stead to present the report and that Mr. Spurr had been inspired to prepare a formal discussion which, at the request of Dr. Bain, would be presented first.

**J. E. Spurr.**—Find out the facts, publish them abroad, and point out their application; it is the great panacea. This is the excuse for technical and scientific societies, not only to ascertain facts and nourish science, but to realize that in doing this they are tearing down, changing, and building principles and policies. Therefore, they are, in part, to direct their fact-finding with a view to this ultimate use. It is proper that the principles and policies of the mining industry should be fitted to facts, and that geologists and mining engineers should appraise and state these facts to the best of their knowledge. This is the sound justification of the Committee on Foreign and Domestic Mining Policy of the Mining and Metallurgical Society of America, and there exists a similar coordinating committee in the Society of Economic Geologists.

It is difficult for us to realize the enormous recent acceleration of mining and consumption of metals and minerals. As Dr. Leith remarked at Chicago, the world has used more of its mineral resources since 1900 than in all preceding history, and the per capita consumption of minerals in the United States has multiplied ten times in forty-five years. Engineers and geologists have some obvious, yet fundamental truths to sell to the public; the first is that the metal and mineral supplies of the world are limited, calculable and measurable, and with the recent enormous acceleration of consumption, will be exhausted in a limited time. Moreover, if the curve of consumption increases, the exhaustion will come about sooner than our present figures, startling though they are, will indicate. The existing metallic supplies are all that mankind will ever have; unlike wheat, rubber, hides, or even lumber, the production once used can never be renewed; there is no second crop.

Our knowledge of the distribution of useful metals and minerals has been increasing with great rapidity and we have amassed a great many data not only as to geographic occurrence of metals, but as to their quantitative distribution. It has now been definitely ascertained that each metal occurs mainly in certain spots on the globe, and that each metal has its own

law regarding this. Geographically, we may say, for example, that tin occurs in the United States—in North Carolina, North Dakota, California, and Alaska; but quantitatively considered, we know that tin does not occur in the United States and never will be found there. This is an extreme example, but we must be sure that the simple fact is generally accepted and understood. We must get down to a quantitative basis and be able to impart to the public our accumulated information of the relative amounts of each metal and where it lies.

The groupings of the minerals of the United States presented in the report, are in four grand divisions: (1) Minerals of which we have a surplus and can export; (2) Minerals of which we have enough but not to spare; (3) Minerals of which we have some but not enough; (4) Minerals in which we are practically bankrupt.

These groupings have been made from the general knowledge and experience of the committee. They know they are correct, relatively, and as groupings economically sound; but those by whom these truths should be accepted do not know it. Moreover, there is the interested party, the miner, strong with local pride and political influence, and with a mine he wants to work or sell, regardless of how he does it. He asserts there is plenty of the ore he wants to mine if the Government will encourage his infant industry with a tariff. "They did that for the tin-plate industry," he may say, "and behold the result. If they will only do it for the quicksilver industry, we shall build up a gigantic mercury mining industry and be ready to furnish the Government supplies in case of war." So, for patriotic reasons alone, the miner desires a tariff.

Our disinterested expert comes forward from the Geological Survey, and compelled by patriotism to be honest, observes that the cream has long ago been skimmed from American quicksilver deposits, and if operated under a high protective tariff they will be entirely exhausted within ten years. It is one general statement pitted against another. What the geologist and engineer must do, I repeat, is to get down to figures. This will necessitate closer scrutinizing and analysis of their general statements and involve further investigation and collaboration, and so will make the engineer more certain of his own conclusions; and, secondly, this concrete form of presentation will carry weight and induce conviction. It is our problem now to take an inventory of our total metal and mineral reserves, by tons and pounds, not by dollars; by weight and not by value; to see how much we have to do business on, and what kind of business



we shall undertake, both among ourselves and with other lands. Surely, that is the fundamental of any sound and hopefully solvent commercial enterprise.

**H. Foster Bain.**—One of the results of the war is a great impulse all around the world to make each nation economically independent; each nation wants to acquire or develop resources which it can control. That is natural, but out of it have grown certain unfortunate things in our national and international life. From it has grown an amount of suspicion and international distrust which is one of the biggest factors in business depression. That you cannot go into a foreign country and develop business is, to a very considerable extent, the result of the distrust that has grown throughout the world and which is, in a measurable degree, kept alive by the desire of each country to render itself safe and secure without much thought of other countries.

To give a specific instance: There has been a lot of friction over petroleum. As a result of the war the British Government has come to take an interest in a specific petroleum company and the Americans must feel the competition of that company. On the other hand, as a result of the war, our own nation has become a large ship owner and we are disturbing the British shipping companies just as much or more than the British Government's interest in an oil company is disturbing us. Now this is between countries that have long been friends and yet this drawing of government into business is making friction on both sides.

If I may give you another example: The conference in Washington discussed the problems of the Far East, among which those of Japan stand very much to the fore. One of the things which others object to in Japan is, that on going into business in competition with the Japanese, they promptly find themselves in competition with the Japanese Government. In every project undertaken by the individual Japanese adventurer or promoter on the Continent of Asia, you will find his government behind him. For this the Japanese have a ready and clear explanation. If you tell them that competition in a business way should be between companies, and not between nations, that the function of government is not that of making business, they reply that because the Americans have had the opportunity through so many years to develop their technique in the organization of business, the Japanese cannot compete along purely business lines. On the other hand they point out that each country and each people has a certain genius, and theirs has taken

the direction of intense loyalty to their government to which they look for direction in their social and business organization. They are thus given an opportunity to express their strength and power; and looking at the problem from their point of view, it is not unfair to put this in the balance against our resources of money and experience.

This new growth of nationalism, which finds its expression in part in the attitude of various governments on mineral supplies, is one of the danger points of the world, and whatever we may gain from having an adequate supply of the various critical minerals, we may lose if we arouse the distrust and suspicion of friends around the world whose good-will may be worth more to us than an absolutely independent supply of these minerals. For these reasons the committee feels, and I feel strongly, that, as far as national safety permits, the flow of minerals in international trade should be free.

There are many reasons for this in the ordinary course of events. There are many arguments for it as a matter of business. You all know in the past to what extent the British balanced their trade by the use of coal, and we found in our experience in the war that exports of chromite from New Caledonia were necessary if we were to import wool from Australia, and on the Pacific Coast we used to find European coke and pig iron a natural content for ships that carried our barley to Europe.

Engineers and geologists should think clearly about these things, and we should endeavor to agree on some of the elemental facts in the case, because with facts and principles clearly defined, policy ought to be easily developed.

The principal contribution of the committee, I think, is the classification of various minerals from the standpoint of necessity. Whether this particular classification is good or bad is a matter for discussion. You can start from two extremes. It seems very clear that now and for a long time to come the United States will have a surplus of copper which it can contribute to the rest of the world. We also have a surplus of coal. When you go to the other extreme, we must import nickel and platinum if we wish to use them. Canada has a supreme position in nickel and while we might substitute or might develop smaller sources of nickel so that we could use them, it would be an enormous cost to us.

One of the important recommendations of the committee is that fact-finding committees should be separate from those considering policy, and, as far as possible impartial—perhaps selected from the outside; and this to my mind is as fundamental

as the principle which separates legislative power from judicial power.

**F. M. Feiker** of the Department of Commerce spoke of the great interdependence of industry, not only in this country but throughout the world at large, and credited the report with revealing a phase of international relations to which slight attention has hitherto been paid. He gave importance to the service which engineers can render in the way of thinking professionally for industry.

**Mr. Broderick**, Commercial Counsellor of the British Embassy, expressed appreciation of the privilege of assisting at a discussion which he felt may prove epoch-making. Speaking of the interest acquired by the British Government in the Anglo-Persian Oil Co., to which Dr. Bain had alluded, he said:

"I do not know under what circumstances they acquired it, but I think I can tell you very sincerely that the fact that they have acquired an interest in the Anglo-Persian Company does not necessitate any policy on the petroleum question; does not in any sense control their policy in connection with petroleum; and I believe them sincerely to be animated with the spirit which runs through this report; namely, they have refrained from taking governmental relation to the development of natural resources. We, more than any government, have kept our hands off in business development or in the development of any industry. I can say very sincerely that that holding in the Anglo-Persian Company does not in any sense mean that the British Government is in the petroleum business in any way that need cause you any anxiety.

"Now many misunderstandings have arisen with regard to the attitude of the British Government toward the petroleum industry and we have had assertions of one kind or another made on foundations which may have appeared substantial but which were very flimsy. The Royal Dutch Shell, the Mexican Petroleum and other companies were named as actually owned by the British Government, and as a consequence, the British Government is held responsible for everything those companies do. The British Government does not own a single share of stock and has no direct interest in those concerns I have mentioned.

"I heartily agree with the suggestion in the report that there be fact-finding committees and that their activities begin before the international situation develops. With facts we can avoid misunderstanding, the only thing that gives rise to dispute between nations. During the war, when we were coöperating for



a great and vital object, we had a most interesting experience. The United States Government appointed several men, experts in their lines, to look after the various activities of the Government in rendering the country efficient for carrying on war, and the British Government took the same step on their side. We lost little time in establishing an efficient system of coöperation, and I think this efficiency sprang from the fact that the United States Government on the one hand, and the British on the other, sent their experts to London and to Washington to be in constant conference and communication with each other. I thought at that time I saw the beginning of a new system of international representation.

"It is very difficult for one country to interpret itself to another through the narrow bottle-neck of official representation which governments maintain in foreign capitals. During the war we had broader and more extensive contacts, and these contacts, being established through experts, were able to send their respective governments information denuded of unnecessary verbiage. It seems to me that in those contacts lies the nucleus of a method for avoiding that kind of misunderstanding which occasions international dispute."

A. R. Ledoux gave expression to the ethical value of the report and predicted that the suggestion of international coöperation in conserving and utilizing minerals would be heartily endorsed by engineers. Speaking of tin he felt that the future for this metal in the United States is by no means hopeless, and expressed the belief that at some time it would be produced in considerable quantity in the northern Black Hills of South Dakota. He suggested also that tin might be produced in commercial quantities in Virginia.

Dr. Ledoux showed how methods of international dealing in ores and metals had been greatly simplified, and also brought out the fact that, through changes wrought in the shipping world, much material formerly shipped to Europe for refining is now routed to Tacoma.

He pointed out how commercial positions are changing. During the shutdown, many copper mines are preparing to handle their own raw material, whether ores, matte, or domestic copper. They will go further and fabricate their product. The West will make all the brass and copper wire and sheets for the Orient and for the Middle West, and practically nothing will come through these ports except refined material which we will continue to export for some time to come. In his opinion, this

means that the smelters and refineries of the Atlantic seaboard will find a growing usefulness in handling material imported.

**Edwin F. Gay.**<sup>1</sup>—I am very much impressed by this extremely important document. I am delighted to see it because a good many of us who saw coöperative action during the war and dreamed of further coöperative possibilities have been discouraged by the two years following the cessation of hostilities. This looks to me like the beginning of the coming-back and it is interesting that it coincides with another coming-back in Washington.

When the war commenced, in 1914, I was a convinced nationalist. As the result of a long historical training, I had come to look with a good deal of distrust and scepticism upon a scheme for international peace. I believed then firmly, and still believe, in nationalism and individualism. Competition is not merely the life of trade, it is the very breath of life itself. The alternative to competition is stagnation. There is no such thing, of course, as complete individualism or complete national control. At the same time competition between individuals and between nations is, I believe, absolutely essential. The rivalry of nations is responsible for the growth of the world, but certain parts of my belief in the impossibility or impracticability of international coöperation were shattered by the experiences of the war.

I want to see emulation and rivalry continue. I want to see nations proud of their national entities and jealous to hold them high, but I also want to see a thorough and honest and sincere effort towards coöperation of nations. I think we have got to have it. Now coöperation rests on understanding and understanding depends upon a knowledge of facts. A suggestion has been put forward about these international fact-finding bodies, an extraordinarily valuable suggestion and rather a revival of what we had during the war. Those were official bodies and some day we will have them again, but meanwhile there is an opportunity of doing these things unofficially, and I am a great believer in doing things unofficially.

I believe this organization has a great possibility of effecting good by linking up with some unofficial organization, say first of all in England, for a common discussion of these things. If men of eminence in these special fields talk with men of equal eminence in Great Britain, it will have an immense influence on governments. If you are going to have oil difficulties, let us

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<sup>1</sup> President of the New York *Evening Post* and member of the War Trade Board and Shipping Board.

have a conference of oil experts and simply give the world the facts about oil. I think that is of the very first importance.

Mr. Gay spoke of a society in New York known as the Council of Foreign Relations with which is amalgamated the branch of the Institute of International Affairs, which has a separate body in England. The purpose of these organizations is mainly the study of questions underlying foreign policy, and he thought the Society might do well to seek some form of coöperation with them.

**A. C. Veatch.**—I do not agree with the estimate of ten to thirty years' supply of petroleum for the United States. The estimation of resources in petroleum is probably more difficult than that of any other mineral. With respect to all other minerals, the result of increase of knowledge has been to limit possibilities. On the other hand growth of knowledge governing the occurrence of oil has resulted in increasing the likelihood of finding it. I remember, as a boy, that the strong scientific opinion was that no oil could be found in Illinois or Indiana because the Trenton rock was too deep, and the same condition was supposed to hold good as to California. Whitney's monumental contribution led to a conclusion on his part that there could be no oil in California because the rocks were too young, too broken, too much affected by volcanic action. Each new field offers certain new peculiarities, so that today oil is a possibility, not a probability, in all the sedimentary series, from the youngest to the oldest rocks, so long as they are not metamorphosed. There are immense areas of sedimentary rocks that are still capable of production, and the oil resources of the world as a whole I regard as very high.

The mistake, it seems to me, in international policy, particularly as I have seen it developed among certain British friends, has been the interjecting of a nationalistic aspect into the question. Before the war feeling started to develop with respect to Trinidad, where the regulations prohibited the holding or cession of any leases except those granted to a British company, and where the transfer of a lease to any company managed or controlled directly or indirectly by a foreigner, or by a foreign corporation, would be cause for forfeiture. This was referred to as the Admiralty clause in the printed lease. That policy was developed and crystallized by the lessons of the war showing the great need of oil, but from no standpoint can I see a basis for the exclusion of free commercial transfer.

Considering the matter from the aspect of certain British friends, it seems to me the better policy, even to accomplish what



they have in view, would be to invite the capital of the world to come to any part of British territory. The essential point is that oil found in British territory, by whatever capital, will in time of national stress be British oil.

Harvard Club, New York City

December 14, 1921

**The Chairman.**—We have the good fortune of having with us Dr. Leith, the Chairman of the Committee on Foreign and Domestic Mining Policy, whose report was the subject of discussion last time and is now to be taken up in continuation.

**C. K. Leith.**<sup>1</sup>—The tariff statement in the report was attacked as a free-trade document, but was not so intended, for this is a problem not of political line-up, but of basic fact. Quantities and grades of minerals should have a bearing on tariff. The question has been asked—what business has an engineer or geologist to mix into the subject of the tariff? I am surprised at that question, because the problem has passed the political stage, and professional men should approach this subject objectively, as a matter to be determined by facts. All that the Committee suggests is that there is one more idea to be considered in Washington. If, after balancing factors, Washington decides to put on or not put on a tariff, that is not our field.

I think the classification of minerals in the report can be modified, but the next step is to back up this report with quantitative analysis. There are certain well known channels of world trade, but these are not mentioned in the report. These can now be named and certain maps are in my mind that can be developed, extended and used with the report.

We do not necessarily treat all nations alike in putting on a general tariff, for the products of all countries are not alike. We know that generally, but we don't know it as specifically as we might. However we want the men who are facing these problems to understand the situation, so that thereafter when they decide them and chart out a certain tract they may have some notion as to what the balances of each particular nation are and what the possibilities are.

When it comes to the second part of the report where we say that the United States has certain minerals in excess, certain minerals in deficiency and so on, there again the situation can be backed up quantitatively and perhaps made to stick. Al-

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<sup>1</sup> This is a summary of the stenographic report of Dr. Leith's remarks.

most every paragraph of our general principles may be followed up by a development and presentation of the facts on which it is based.

Now, just as soon as we have taken that step, which is, perhaps, partly under way already, what are we to do? Are we to amuse ourselves in talking about it? Are we to write a little committee report and file it in the archives and let it go at that? This report has been written on the assumption that the mining industry as a whole is trying to develop some sort of a policy. It is written under the assumption also that the people in Washington who are most concerned in formulating and putting into effect our policies need an unbiased view of the situation if such a view can be gotten out of the mineral industry. I believe it can be done and that it will be welcomed specifically in connection with measures which are actually pending in Washington. Such casual personal conferences as a few of us have had in Washington from time to time since we began to think about the principles of this sort have indicated an eagerness in several quarters to get hold of these elementary principles and to apply them fairly directly. As an illustration, I might cite certain agreements which have been pending in the State Department for months past with other countries with reference to the development of minerals in foreign countries. Some of us had an opportunity to see a tentative agreement on the oil question which was being taken care of by the Administration at the time in Washington. I saw it in a Tulsa, Oklahoma, paper, with all the principles stated and with the additional statement that while this was not deemed to be officially put forward as a part of the program of the present peace conference, at the first opportunity the State Department would present these particular principles.

**W. R. Ingalls.**—It seems to me that progress in the consideration of the Committee's report will be made by concentrating attention. For that purpose, therefore, I offer the following resolution and make this as a motion:

WHEREAS, the New York Section of the Mining and Metallurgical Society of America considers the report of the Committee on Foreign and Domestic Mining Policy to be of special and pressing importance in national and international affairs at this juncture, and urges furtherance of the Committee's work in order that the Society may play a part in promoting the cause, therefore be it

RESOLVED, that the New York Section of the Mining and Metallurgical Society of America approves the report of the Committee on Foreign and Domestic Mining Policy, and be it further

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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RESOLVED, that the New York Section of the Mining and Metallurgical Society of America would like to have the coöperation of the Institution of Mining and Metallurgy of Great Britain in the consideration of this report, and be it further

RESOLVED, that the Council of the Society be requested to institute a referendum among the members of the Society with the object of making approval of the report of the Committee on Foreign and Domestic Mining Policy an act of the Society, and that an invitation be extended to the Institution of Mining and Metallurgy of Great Britain to coöperate with the Society in the consideration of this report.

The effect of this motion, if it be passed, is to present the case back to the Council with the approval of the New York Section, whereupon the Council, if it sees fit, will institute a referendum among the entire membership of the Society and the subject will be thrown specifically into discussion of the Society as a whole. [The motion was seconded by Mr. Westervelt.]

[Considerable discussion followed as to the appropriateness of submitting the report for approval before being revised, both as to its phraseology and various points that might appear controversial. Nothing fundamentally different was suggested but simply the idea of clarification. It was decided that the resolution as it stood in principle should be put to a vote, and the motion was carried.]

**The Chairman.**—There has been a good deal said tonight in connection with this report on the subject of tariff and as we have approved the general principles of this report, the matter is to be submitted to a referendum and every member is to have an opportunity to write his letter and raise his point about the tariff. Perhaps it is wise to speak baldly of it as the tariff, and not to camouflage it by other words. We will throw the discussion open to members and guests.

**Mr. Ingalls.**—I think it is unfortunate that the word "tariff" or the question of tariff has been introduced into this discussion. There is no reason why the New York Section or any other Section should not discuss the tariff if it wants to, but I am sure that the Council will not consent to any action by the Society on tariff questions. If the membership insists on any such action it will be over the heads of the Council with referendum and recall and all the rest of it. We will appeal to the country on that issue.

It has been a fundamental principle of this Society from its inception that we should not enter into commercial controversial questions. We will enter into economic questions particularly



affecting the welfare of the industry, we will enter into questions such as the protection of mine investors, the prevention of accidents in mines, revision of the mining laws, and many others that we have gone into, but we will not go into questions wherein we are likely to strip asunder for reasons of varying self-interest.

I did not read the Committee's report as an expression on the tariff; I did not read it as propaganda one way or another; I read it as a broad, constructive suggestion to study and review our position as to mineral resources, to urge us as engineers to study the respective industries through sub-committees best acquainted with each, and establish facts. That is absolutely within the province of the Society. After we have established the facts it is then for Congress and for bodies that are interested in pushing things one way or another to act upon those facts. Our duty is to study these industries professionally, and establish the conditions that prevail in each of them to the best of our ability. I am very sure that the classifications that the Committee made in this report were tentative. We understand they were made largely for the purpose of illustration, largely to inspire such study as this that I have suggested, which I am sure was contemplated by the Committee and which was discussed at the last meeting of this Section. I am therefore sorry that the question of the tariff has been raised.

**The Chairman.**—Of course the question is really a reflection of the study of how best to handle our domestic mineral policies. We might speak of it as a conservation of our resources. We have stated our program tonight as a discussion of our domestic mining policy and the tariff. I think we will continue with that subject, perhaps under the guise of our mining policy.

**D. M. Liddell.**—Dr. Leith has already commented on the fact that the Committee was averse to putting in too many figures, but the Committee has made a study of certain of the figures that none of us can do so generously or so well, and I am sorry that it has not given us, under classification D particularly, some of the figures showing our developed reserves of certain minerals as compared with our yearly consumption under normal conditions.

In this last war we were under the advantage that Great Britain controlled the seas. None of us wants to see another war, but despite any four-power treaties or anything that we may do, we may see another war come as suddenly as the last one did and we may be under the disadvantage of not having

any allies that can hold the seas for us when we are not able to do it ourselves. There are certain minerals of which our supplies are very limited as compared to our yearly consumption, and that fact should be pointed out by the Committee. It should be very plainly put that if there is a high tariff on those minerals that forces us to use our own resources, the next war may catch us entirely without magnesite. According to the most optimistic report that has been given we have about 7,000,000 tons, and the last bulletin of the Geological Survey cuts that down to 3,800,000, and some of that isn't good quality. That would last possibly nineteen years. Austria has 120,000,000 tons according to our late figures and probably it isn't very thoroughly explored. That is a case where we ought to draw on Austrian resources and leave ours untouched.

As for chromite, we haven't nineteen years' supply of that, and manganese is another thing. Everything that forces us to use our own small resources is economically wrong. We haven't a surplus of labor in this country. We can use our labor more economically than by exploiting our minerals, of which we have a very limited supply as compared with the resources of the world.

**W. Y. Westervelt.**—As illustrating Mr. Ingalls' point of the difficulty of getting into a political discussion or a discussion of important policies which have a bearing on things we are interested in, my good friend's remarks affect my mind in an opposite direction. If we haven't these deposits developed and we get into a war in the next nineteen years we won't be able to do anything. It would probably take ten years to develop them and the war would be lost and the Germans would do the developing.

**Mr. Liddell.**—It didn't take us nineteen years to start up our magnesite industry in 1919, did it? That is the answer. It didn't take us as much as six months to open up a little chromite deposit in Wyoming.

**S. H. Dolbear.**—Until the war nothing was known of the Washington deposits of magnesite and the only ones known were those in California. Now, we succeeded in the brief time of three years in developing what was thought to be 7,000,000 tons (which we now know to be 3,800,000 tons) in an emergency, and it is entirely within the range of possibility that all of the magnesite deposits in this country haven't yet been found. It would not be surprising at all in the same belt to find other properties constituting potential resources. I feel therefore that

in the case which Mr. Liddell cited, that of magnesite wasn't well taken. On the question of chromite and manganese I feel that his point is well taken and there is a reason to conserve those resources. I have had some personal experience in both of those minerals during the war and I know under what difficulties adequate supplies were developed.

**Mr. Liddell.**—I should like to have put into the minutes a thing which most of the people of the United States haven't got into their heads and that is that mineral resources do not grow by sensible increments; that we are a big country, but there is no mineral we can say is found in limitless quantities. They don't grow except in promoters' prospectuses.

**Mr. Westervelt.**—Do any of us know of any resources which are seriously less now than they ever were before, no matter how extensively they have been mined; in other words, is it not a fact that as far as a young country like this is concerned the more you develop the more you know you have got?

**Mr. Liddell.**—When I was a boy I used to live out in the natural gas belt of Indiana and they used to let the street lights burn all day because it was cheaper to let them burn than it was to turn them off. Whenever they tapped a new field there used to be great torches burning night and day to advertise that they had a limitless supply of natural gas, and now look at it.

**Mr. Westervelt.**—I am no oil man or gas man, but I should like to know whether there is more natural gas being used now than was known to exist. Of course, I know in specific districts it is entirely used up, but I think it is possible we might find more natural gas used today than ever before.

**Van. H. Manning.**—There is more natural gas used today because the industries are demanding it. It is a rapidly diminishing supply. It won't be here very long.

**Mr. Liddell.**—Can some one of the anthracite men answer this: Isn't our anthracite reserve diminishing?

**Mr. Westervelt.**—Our anthracite reserves are rapidly diminishing. If we start with a fixed amount and we mine so many million tons there must be so much less, but that isn't the point I raised. It is that our knowledge increases with the quantity that we use.

**C. C. Burger.**—May I give a practical answer to Mr. Westervelt about the natural gas matter? I happen to be interested



in the so-called Miami field. When we first went down there and bought the mine we did, we figured the ore reserves on the basis of pre-war valuation. Zinc concentrate was then selling at \$70 per ton. Various engineers in the enterprise figured our reserves on a pre-war scale and made a very pretty picture. The property appeared to be all right from every angle as far as we could see. The only thing they neglected to figure was that we could have a post-war scale of prices for the metal low beyond precedent but with war costs still in effect. The main reason for that was the constantly increasing cost of smelting zinc ore, due to the constantly increasing price of natural gas. For instance, to obtain the price of zinc ore in those days you could take the price of spelter and multiply it by eight. Five cents a pound for spelter meant \$40 a ton for Joplin ore. Today spelter is selling in New York for more than five cents a pound and we are receiving \$26 a ton. When we took the property over natural gas was selling at four cents a thousand feet. It is now twelve or fourteen cents a thousand feet. I believe that answers your question about the natural gas district.

**G. C. Riddell.**—Once upon a time I knew a great deal about the tariff. I knew enough about it to make me resolve that I would never speak about it in public, because I think talking about the tariff is a great deal like talking about religion. As I have listened to your discussions here tonight it does impress me that you have here a wonderful report. You shouldn't delay getting it shaped up, finished up, and placed in the proper hands in Washington.

While I was working in Washington as a metallurgical advisor to the Tariff Commission this very same report in principle and in the main was placed by the metallurgical people of the Commission before the Tariff Commission. It has gone straight before the Tariff Commission almost in its entirety as part of a great many other studies of the economic situation in minerals, and if now you polish it up and bring it to an intensive head and get it either to the Commission or to the Senate Finance Committee or the Ways and Means Committee, it will do no end of good. There is in Washington certainly a growing realization of what the real situation is as it is so clearly brought out in this report, and whether one be a Republican or a Democrat or a Socialist or what not, there is, as never before in the legislating body and in every thoughtful group of men whose minds are bearing on the question, a new realization of what the tariff means. While this certainly is full of dynamite, this report as I see it, unless it is very severely trimmed and changed,

will be called a free-trade document, a free-trade argument. There is no question about its effect, but are you not doing the greatest good if you send such a wonderfully splendid report as this right to the seat of legislation?

My time these days is spent very largely in the importing and exporting trade between China and America. I have a great deal of contact with Chinese tungsten, antimony, manganese, and so on, and more and more I am becoming convinced, and I am hearing that everyone else whether they want to be or not is becoming impressed with the new order of things. This afternoon, to check up my own views on the subject, I asked Babson's statistical organization to tell me just what the Allied debt to this country was and what the total cost of the war was in destruction, in interest payments, and in general expense. After figuring about three hours Babson's man said that, as far as he had gotten, the total cost of the recent war up to August 1, 1917, was some ninety-seven billion dollars. At that point he gave it up, telling me that he thought it was a safe guess to say that the war had cost 250 billion dollars in its entirety. Right after that he checked it up by calling up the *New York Times* office on it and discovered that somewhat carefully a year ago the *New York Times* had arrived at a figure of 355 billion dollars worth of expenses and loss and setback to the world. The nations of the world owe us ten billion dollars as a government and they owe our merchants some four billion dollars. The whole world is 350 billion dollars behind in wealth and production. There never has been a time when it is so absolutely essential that those corners of the world which are able to produce raw materials to advantage should be called upon to supply their quota. In other words, the tariff problem must as never before be tempered with this new thought; that is, everyone of us wants his debts paid, and if we look into it and study it everyone of us must agree that they can only be paid by the exchange of merchandise. Imports must balance exports except for a small margin for traveling expenses, shipping, etc., which is a very small factor. How are we going to write our future tariffs? Your report is the clearest note that Congress has ever heard and I cannot urge you too strongly to get going on it and get it down there.

**Mr. Spurr.**—I don't like the word "free-trade" and I don't like to be called a free-trader. Tariff for revenue only isn't much discussed nowadays. I notice in the report of the United States Chamber of Commerce that the tariff for revenue only doesn't enter very much into economic considerations these days. It

could account at the very best for only about five per cent of our necessary revenue. The problem that the Committee is presenting is a question of efficiency in management. That is a new term and a good one and that is what we are after. We are after the efficient management of our mineral resources. That is the whole problem and the first thing is taking an inventory of our stock in trade. We know it is limited. We are all of us engineers and geologists enough to know that ore doesn't grow. We most of us have exhausted mines enough to know our stock is continually growing less. We are getting very close to the end of our coal, and even with those minerals of which we have a large quantity it is only a question of time when the supplies will begin to look pretty bare.

Mr. Westervelt asked about instances. The gas incident that Mr. Liddell spoke about is one. I heard a natural gas producer, who I take it is the principal controlling factor in the natural gas production in the Middle West, describe in vivid terms how that whole section was being exhausted so rapidly that it was one of the principal economic factors to be adjusted in the future at great cost and with a great change in the conditions of living. In the matter of chromite, if I remember rightly, in the early days of this century the principal production came from Maryland. Soon after that an American discovered chromite in Turkey and for quite a while the principal chrome resources of the world were drawn from around the Ægean Sea. Then the chromite deposits became spotty and pockety and impoverished, and the principal source of chromite became, I believe, Rhodesia and New Caledonia. We can see the cycle passing around the world, and with our enormous industrial development I think we will live to see a good many of those cycles.

It is necessary to get down to figures and find out what our resources are. That is the next thing that should be done in carrying out the general recommendations of the Committee. I think there are data available for determining in a broad but sufficiently accurate way how much we have of each of our mineral supplies. I think that the Geological Survey is the instrument to do that and I am sorry that the Director of the Survey isn't here tonight; but I have talked with him about it and he thinks he can do it. He is going to do it, as a matter of fact. He is going to work upon the problem as soon as he possibly can and estimate on what we have, much as we estimate the ore reserves of a mine. My belief is that he can do it with about the same degree of accuracy, because in estimating a mine



we have to make approximations and deductions which we express in terms of tonnage. We estimate the ore that we think is in sight; sometimes it is there and sometimes it isn't. Then we measure probable ore and then possible ore. After all, it is a pretty broad approximation but good enough if a skilful man makes it. In the case of the ore reserves of our country, if a skilled man gets on the job with all the data he has, I believe they can be estimated with very much the same degree of approximate correctness as the ordinary engineer can estimate the ore reserves of a great undeveloped mine.

Now, if we have that fundamental basis to act on, we can take those things of which we have not enough and be careful of them. We are going to keep as much coal in our bin as we can and borrow as much from our neighbor as we can. We are going to import, and we don't want any tariff. On the other hand, of some things we will have plenty and can sell them to our neighbor. These it is our business to exploit because they are sources of revenue and we want to have everything clear for importing business.

**Clinton H. Crane.**—I can't help taking up one of Mr. Spurr's statements, as it strikes me as amusing. The only condition under which a tariff is any good to the man who is developing a product is when he produces less than the country needs. The minute he produces more than the country needs the tariff does no good because his price is regulated by the foreign market.

A tariff is no good to copper. Copper in price will sell the same here as it does in London. A tariff is no good to zinc because there is a surplus of zinc produced in this country. A tariff is a great deal of good to war minerals because if they don't have a tariff they won't be produced at all. Therefore if our tariff isn't for revenue but for protection, this document, with which in many ways I have every sympathy, is a free-trade document; because if we follow out the plan of this document it inevitably means a tariff on the things that don't need tariff and no tariff on the things that do.

**Mr. Liddell.**—Must a plain statement of facts necessarily be a free-trade document? Can't we refer to Cuba as being the sugar-bowl of the world without getting our friends from Louisiana on our ear? Can't we admit Austria has thirty times as much magnesite as we have without offending our friends in the State of Washington? Can't we tell our Washington friends facts? I can't see that we commit ourselves either to free-trade or protection.

**Mr. Burger.**—May I take this opportunity of stating in answer to Mr. Crane, a serious objection to his remark that the zinc industry doesn't need a tariff? While I haven't at my command the figures that Mr. Ingalls could give us on the zinc production, my general impression is that previous to the war the importing and exporting of zinc was about on a parity.

The zinc territory of Oklahoma is one of the greatest mining fields in the world, and it is estimated down there that the average cost of producing a ton of Joplin concentrate, allowing for amortization of cost of property and equipment, is something between forty and fifty dollars a ton. Since a few years ago the price of zinc concentrate has been going down, until six months ago it sold as low as \$18.50 per ton. As one of the producers there, we kept our mines going and exhausting our reserves in order to keep the men from starving. All of the mines including our own, have been able to live only on account of the high content of lead. We manage to keep going, but at the terrific cost of getting out our ore and wasting it. It is being taken out now and sold at \$26 a ton, which is actually \$20 under the cost of the ore. Attempts have been made to get a better price for spelter which have been offset every time by zinc dumped into this country from abroad.

**Herbert Wilson Smith.**—Every argument has to start with an agreement. In our Mining Congress meetings when we discuss the subject of the tariff there is a very warm sentiment, and the sentiment of our meeting and yours wouldn't be at all unanimous. We will start with the agreement for the purpose of this argument that our motives and purposes back of what each of us is doing are identical in our attempt to arrive at a truly efficient management of our domestic mineral industry. Mr. Weld and I have agreed that there was a very proper divorcement of the issue of an international mining policy and of the issue of the tariff. On an understanding of international mining policy as it affects the question of American investment in mining abroad we are probably in accord.

The work that has been done on mineral tariffs in Washington where I have been serving for the last three years has been done on a basis of giving to the committees considering these matters as adequate information of the same thing that has been discussed here this evening, as it was possible for us to deliver to them. Politics has not entered into it. At the last meeting you mentioned a fact-finding committee. I appointed myself chairman of a fact-finding committee when I first started

this work and the condensation of information that I gathered grew until it became quite unwieldy.

When the hearings began a year ago I realized that the members of Congress with their multiplicity of duties couldn't consider adequately all the evidence submitted. I realized that even the members of the committee who had these tariff issues in charge couldn't consider every item of evidence that was submitted, so I began the preparation of a tabulated chart covering all of the vital considerations. These covered many more things than the reserve within the United States. They covered the present status of the mineral, its present status in our existing tariff law, its possible status. They covered the imports from foreign countries; that is, imports based on pre-war, war-time and the present basis of importation by the latest available statistics. They covered the relative position of these countries with the United States as to their trade balance and their debtor balances.

Now, in speaking of countries being debtor nations to the United States we must make a distinction. We must differentiate between whether they are debtor nations as to their cash indebtedness to the United States, or whether they are debtor nations as to their debit or credit balance of trade. We must consider a country's present international prosperity as reflected in its basis of exchange. We must consider the labor conditions in that country, the relative surplus or scarcity of labor as reflected in the labor cost of that country. We must consider the price of the material imported and produced in this country, the cost of production in the United States and abroad. We must consider the nature and extent of ore deposits, foreign and domestic. We must consider the nature and extent of our own ore reserves and the spots in which these are found. We must consider the number of people who are dependent on this industry within the United States. We must consider the amount of money invested in this industry in the United States. We must consider whether it is proper for us to hold superior in each individual industry, conservation of resources or conservation of industry; then we have to consider the request that the industry is making itself of Congress, and what the Tariff Commission has recommended insofar as it has gone in its deliberations.

That sounds like rather a mass of information, but I prepared that for the use of, first, the Ways and Means Committee, and later for the Senate Finance Committee, in the form of a continuous chart. I should be very glad for any members of



the Society or any members of the Committee who would be at all interested in this to have a copy. While there are items on this which are subject to fluctuations, such as current labor cost abroad and current exchange rates, this has been corrected as quickly as possible down to date. It covers a range of twenty-seven different minerals, beginning with antimony and ending with zinc, and the vertical columns represent the minerals, antimony, arsenic, asbestos, etc. The horizontal columns represent the classification that I just recited to you. The schedule paragraphs represent the imports from foreign countries, pre-war, war-time and present, the trade balance, the cost of production, foreign and domestic, prevailing price, foreign and domestic, prevailing price, pre-war, war-time and present, the annual production, and so on through the list.

Further, in connection with the gathering of these statistics, certain vital facts became apparent. I was repeatedly struck by the fact that industries which had existed in this country on a permanent basis, whether they were protected by tariff or whether they were protected by a combination of natural circumstances, offered a different result to the ultimate consumer than did those industries which were suffering from wide fluctuation. I will show you two charts I prepared on that. The first chart is a range of price fluctuations and production fluctuation of ten unprotected mineral industries over a period of twelve years from 1908 to 1920. The continuous line represents units of price and the broken line units of production, showing that, as prices increased, production increased with them until at the peak of the price there is over-production, which results in a rapid lowering of the price and diminution of production until it is carried to a point which is below the cost of production and leads to no production or just enough to keep the mine going. This brings about a scarcity of material, which brings about an increase of price and an increase of production.

At the low points of production there is certainly bankruptcy in the industry, at the high points there is certainly profiteering, but in neither of these cases is the man in the street interested. He doesn't care whether an individual zinc producer goes broke or whether the zinc industry as a whole collapses, but he does care vitally what a zinc galvanized wash-tub costs, and so, covering as wide a diversity as possible, a further line was prepared showing the price of commodities of which these raw materials form a base. The interesting point about this statement is that the consumer doesn't benefit by the low levels in price which represent bankruptcy to the industry.

For example, in 1918 when copper was thirty cents a pound, when quicksilver was \$126 a flask, the price of fulminate of mercury blasting caps was \$16 a thousand. At the time this chart was prepared, copper was twelve cents a pound, quicksilver was \$27 a flask and the price of blasting caps was \$18 a thousand. That this is not peculiar to the mining industry is shown by a similar application in the wool industry. In 1912 when we were under a protected market for wool—that was under the old Payne-Aldrich tariff—a firm in Jacksonville, Ill., which produced woolen cloth from wool which it bought from the immediate district, wove its cloth, made it up into a good serviceable all-wool suit which was well made and suitable for every use and which it sold for \$9.00 wholesale; that is 8% ten days, which made that suit cost between eight and nine dollars. Today with our woolen warehouses in Boston full of wool, with farmers throughout the country crying for relief because of their huge stock of wool, with wool at a lower price than it has been for many years, that same suit is sold by that company at \$28 wholesale. The point of this is that with these rapid ranges of fluctuation the consumer doesn't benefit by the low prices because the price had been raised to those high points and the manufacturer is loath to lower his price for a variety of reasons. In the first place, he has with great difficulty got it up to that point; and in the second place, he is equally afraid of a return to this high peak price of raw material cost.

A similar chart was then prepared from a group of ten protected mineral industries, industries which had been protected by tariff or which had been protected by a system of natural conditions which made the industry in this country secure in its competitive life and in its continuous production. The units of price and the units of production follow the same lines of supply and demand, with the difference that the protection, whether it be natural or whether it be tariff, so stabilized the production that the price doesn't reach the low points which make a diminution in the production and bankruptcy in the industry. Similarly, there isn't the rapid increase of price which brings about over-production, and the important thing is that the prices of the commodities are actually figured on a lower index probably than the price of the materials in the unprotected mineral industries.

A suggestion has been made that we can't create an element; we can't create resources by legislation. That is true. We can't by legislative enactment put a thing into the earth which isn't there. We can immeasurably develop it there. What about helium? Five years ago there was hardly any helium in this

country or in any other, but that helium which we have developed and which we have discovered has been due entirely to legislative enactment, entirely to the efforts of scientists who were directed by legislation which made it possible to develop the industry to the point where it is now.

In the report which has been prepared there is one paragraph which I should like to read now:

In these cases there should be careful consideration of possibilities of adapting our extensive low-grade reserves to our needs, with a view of finding whether feasible and efficient processes for their use may not be developed without excessive cost. If so, some measure of protection would be reasonable. For instance, there are very extensive deposits of flake graphite in the United States, many of which are handicapped by a fineness of texture which is said to make them undesirable for one of their principal uses, the manufacture of crucibles. War experience indicated that the American grades could be used to a larger extent than had before been anticipated; but with the resumption of peace conditions, foreign supplies have again dominated the market. Without committing ourselves definitely for or against a tariff, we suggest that a case of this kind affords a reasonable field for investigation as to the possible application of a tariff.

To my mind that is the finest thing in your report. We have discussed this tariff with the idea that we were legislating on something that was going to be permanent, that under such a tariff our reserves would be completely depleted in nineteen or twenty-five or thirty-seven or fifty-six years as the case might be. We know that tariff bills come before Congress with great regularity. We will say that mineral tariffs are an experiment. Surely the problem of tariff protection of raw materials isn't new, but tariff protection of raw materials in the form of natural resources of a wasting character is new, and for that reason the arguments against it are more apparent than the arguments for it from a theoretical basis. But the experiment of free competition which we have tried during our economic life hasn't built up these industries. They were built up stupendously during the war when a combination of circumstances developed them. Now, let us for the life of a tariff try that experiment again. Let us try an experiment which will give these industries a normal life in this country and which at the same time will bring revenue into the United States Treasury.

The argument against tariff has been further expressed because of the necessity of the continuance of foreign trade. That is based on the thought possibly that under a protective tariff our imports diminish. The statistics of our custom house offices



do not show that to be the case. Our imports from foreign countries have increased with great regularity since the beginnings of this country regardless of whether we had free-trade or a protective tariff policy governing our customs laws, but the nature of the things imported has markedly differed, and it is far better for this country that it import Bokhara rugs free of duty and levy the duty on Wilton carpet made in Massachusetts. It is far better for this country that it import free of duty coffee produced in Brazil and levy a duty on sugar produced in Cuba.

There are things in the report which, if we are to consider it from the standpoint of tariff at all, would give an idea that I don't think is in the mind of any member of the Society or any member of the Committee. I notice, for example, tin among those articles which we lack almost entirely. Now, the committee of Congress deliberating on this report would say there should be no duty on tin. Now, let us analyze the requested duty on tin. It isn't a duty on tin ore, but is a duty on pig tin. There was built up in this country since 1916 a production of tin which grew to as high as eighty million pounds per year. Not at all a small industry, but an industry which has absolutely collapsed today, cannot exist without protection.

The further objection has been made as to our balances of foreign trade. This is based on the thought that there is an international balance sheet between nations which can be stricken off every year. That isn't the case between nations any more than it is the case between individuals. We have to bear in mind that the nations from whom we buy aren't the nations to whom we sell, and certainly the nations from whom we buy materials aren't the nations to whom we sell the comparable minerals of at all similar character. For example, we buy from Brazil manganese, we buy from Brazil coffee, we buy largely of raw materials from South America, and yet what has our export trade in South America amounted to? We have for fifty years been trying to build up an export trade to South America comparable with that of Europe. The debt of European nations to the United States is also a very vital consideration. The reason why we haven't built up trade in South America is due to two things. It is partly due to a well recognized difference in our business methods and the business methods of Europe, but the vital reason is this: Europe has financed South America and Europe owns today enough bonds, national, municipal and industrial, of South American countries to entirely pay her indebtedness to the United States. Will Europe pay her indebtedness to the United States in that way? We know she won't

and that is her business, but it is idle to say that we can't develop foreign trade, to say at the same time that Europe can't pay her debt to us, when by that one transfer the whole situation would be adjusted—an impossible thing, I grant you, but a consideration which exists.

The one thing that I wish to emphasize again is the thought that was given to me by Mr. Dolbear, and that is the difference between the conservation of resources and the conservation of industry.

**Dr. Leith.**—I should like to comment very briefly on the words of the last speaker. I am very much interested in the work that this organization has done and I think we are both trying to get at the same thing. If we could get together upon some method it would be very desirable. We do tend to emphasize more the nature of the reserves and the conservational elements.

Now, as I understand this argument, there is a decided underlying assumption that practically all minerals in the United States are capable of beneficial protection and control by the government; in other words, if today nothing had been done in this country and we knew nothing about the situation in regard to minerals I would say, "Let's try all of them, let's put on all the forced draft we can," but we tried it for a good many years and we are reaching a position now when we are beginning to see that there are certain limitations; that it won't do to go on the basis any longer that by putting on a protective tariff, for instance, or any other sort of protection we can in some fashion or other, produce chromite in large quantities in this country. This talk of experimental tariff I would agree to within certain limitations, but what I would object to is to fix perhaps some discrimination by not applying the same principle to all, making it possible to make this tariff a little more effective on certain minerals in a group where some kind of forced draft might be beneficial. I might be mistaken, but in looking over Mr. Smith's list I get the impression that there is an underlying assumption that there is practically no mineral in the United States that cannot be benefited by a forced draft.

**Mr. Smith.**—If I can qualify that, I wish to make clear that this chart is entirely a statistical chart and the conclusions it presents in the case of each mineral are not all affirmative, and if I may say so we are agreed with Dr. Leith on the subject of chromite.

**Dr. Manning.**—When I accepted service on this Committee I felt the report was more for the guidance of the State Depart-

ment or the Department of Commerce than it was to Congress. The United States Chamber of Commerce appointed a committee which has drawn up recommendations and are submitting them as a referendum. I won't read you the arguments pro and con, but I will read you briefly the recommendations which they have put in for each item:

The recommendations without giving the arguments are that tariff legislation should be so framed by Congress as to permit flexible rates, and authorize changes from time to time without revision of the tariff. A reasonable latitude should be provided for in order that there may be flexibility in the rates.

In regard to taking the tariff out of politics, the recommendation on that particular subject was this, that tariff legislation should provide for and create a Tariff Adjustment Board, appointed by the President, confirmed by the Senate, with such a tenure of office as to remove them from political influence, and that this Board should be separate from the present Tariff Commission.

The committee made the following recommendation: Full consideration should be given to reasonable protection of American industries that are subject to destructive competition from abroad.

On the subject of dumping, the Committee recommended that the general principles of the Anti-Dumping Act of 1921 be approved and legislation of that character be maintained on the statute books with such amendments as may be found out to be necessary to prevent dumping of foreign goods in the United States.

On the question of maintenance of export trade, the Committee recommended that in framing tariff legislation the principles of maintaining our export trade should be observed insofar as consistent with the principles of protection directed in Section 3. Our tariff legislation should be framed with a view of meeting discrimination, direct or indirect, against the trade of this country.

On the question of American valuation vs. ad valorem duties, the Committee recommended that the Chamber of Commerce should urge Congress not to change from the present long established basis of ad valorem duty to the new basis such as has been proposed.

That is the report of the Committee, composed of various men in the industries, twelve in number, and it has been submitted by the Chamber of Commerce for a referendum.

**Chas. W. Potts.**—There has been a good deal of discussion of the twenty-seven mineral schedules of the Fordney Tariff Bill, pro and con. There are opponents, of course, of each of these schedules, but if I may be permitted to paraphrase a little sen-



tence in Caesar, "Of all of these, those opposed to the manganese schedule are the fiercest."

In the consideration of the manganese schedule, the whole subject seems to hinge upon the matter of our reserves. The statement has appeared in the daily papers and the technical press from time to time that if entire dependence is placed upon domestic reserves there is only sufficient manganese in this country to last our steel industry for not more than three years. Assuming that the requirements of manganese ore for the future will be in about the same ratio to the production of steel as it has been in the past, and assuming that there will be a production of about thirty-five million tons of steel a year, an estimate that I have seen frequently quoted, it would require about seven hundred thousand tons of manganese ore per year, averaging about 50%. This would mean then that there is only about two million tons of manganese ore in this country suitable for steel making.

Upon investigation of the manganese reserves of this country, I have tried to get in touch with the owners and proprietors of every one of the 1181 deposits that have been examined and reported upon in the 427 districts in the 32 states, and if I can place reliance upon the estimates that have been furnished, a great many of them by engineers of note, we have in this country a good deal larger supply of high-grade manganese ore suitable for making ferro-manganese than the estimate of two million tons which I assumed a while ago.

I have also discovered in my investigations that, in addition to a larger reserve tonnage of high-grade ore, there is a large reserve tonnage of ferruginous manganese ore, a large reserve tonnage of manganiferous iron ore, a large reserve of low-grade manganese ore which is capable of beneficiation that hasn't been taken into account in estimating the period of time which our manganese reserves would last.

I also find that there is no account taken of improved metallurgical methods of utilizing these ores. There are a number of processes that have been developed or partly developed during the war period that hold out great promise of increasing our reserves. There were also developed during the war period new practices in steel making in which manganese in other forms could be used to advantage besides the addition of a small amount of ferro-manganese in the ladle or at the time of pouring.

Taking all these various factors into consideration, it seems to me that there is reasonable ground for us to assume that there is a sufficient tonnage of manganese-bearing ore in this country

that is capable of economic use to last this country for a great deal longer period than three years, the period which is very commonly suggested.

As evidence of the potentiality of this country to produce manganese, I think it is well to repeat the fact that our production in 1916, 1917 and 1918 and each succeeding year was about three times the production of the preceding year; and that the production of high-grade manganese ore in 1918 was an increase of 117 times the average production of manganese ore during the five-year period from 1910 to 1914, during which period the average annual production was 2612 tons. In 1918 it was 305,869 tons, and the average production of manganiferous ore and ferruginous manganese ore during the five-year period previous to the war period was about 52,000 tons. In 1918 the production of ferruginous manganese ore and the manganiferous ore was, as Mr. Smith said, 1,396,000 tons. I fail to know of any deposits that were exhausted.

I have been interested in the production of manganiferous iron ore in Minnesota and also of high-grade manganese ore in Arkansas. I know from experience in Minnesota that the common report that manganiferous ore throughout the United States is exhausted is wrong, citing as an instance the Sagamore Mine, in which I think there are seventeen million tons of manganiferous ore. The question is raised—if there is so much manganese ore in Arkansas, why wasn't more produced in 1918 than 1917? In 1917 there were eleven washing plants built in that district. Practically all the available men were being utilized in putting up these plants. No one of them got to the point of operation. If these plants were enabled to operate, instead of 16,000 tons of ore being produced there could have been a hundred thousand tons produced. The statement that I am making isn't a loose one, but is the result of rather careful calculations.

## COMMUNICATION

The following communication, in connection with the approval of the Report of the Committee on Foreign and Domestic Mining Policy, has been received from Mr. Samuel H. Dolbear:

At a meeting of the New York Section of the Society held December 14, 1921, Mr. Ingalls introduced a resolution in which the report of the Committee on Foreign and Domestic Mining Policy was approved; the resolution also asked the approval, by referendum, of the Society as a whole,

and presentation of the report to the Institution of Mining and Metallurgy of London as a basis of coöperative action by the two organizations.

This is written to protest against the adoption of the report in its present form, and in pointing out what appear to me to be serious objections to the report, I do so with due deference to the distinguished personnel of the committee. I believe that my own objections to some features of the report are shared by many other members of the Society.

The principal differences of opinion may be summarized as follows:

- (1) There is a lack of agreement as to facts.
- (2) It is essentially a free-trade report.
- (3) A reclassification of some of the minerals is necessary, and added classifications are desirable.
- (4) The statement should be made as to whether the subject is to be considered from the point of view of greatest advantage to the United States, or the greatest good to the entire world regardless of the result in the United States.
- (5) The principle should be recognized that the United States is essentially a producer of raw materials.
- (6) Such generalizations as "Minerals cannot be created by legislation" should be omitted.
- (7) The relation of imports to the international creditor-debtor situation should be fully summarized.
- (8) The question of tariff cannot be omitted from a report of this character, and since it is a subject upon which people hold pronounced and radically different views, it should be fully presented.
- (9) In considering the subject of tariff, the result so far as the "ultimate consumer" is concerned, should receive consideration.

(1) Regardless of the merits of other questions involved in this discussion there can be no denying that there must be an agreement as to the facts, which is the first of the objections above outlined. The subject Potash may be taken as a representative case. The report places this substance in Class C, and we are informed that minerals in this class are deficient and that "imports of minerals of Classes C and D will continue to be necessary and can be stopped only at great cost." At the annual meeting of the Society, Dr. John Teeple (formerly President of the American Chemical Society) informed us that there has been developed in this country a supply of potash sufficient to last 100 years, and that with protection for a period of five years, the industry will be self-sustaining. He offered to provide the committee with satisfactory evidence to prove this assertion. Dr. Ledoux has indicated that the prospect of developing a tin supply is not so hopeless as might be inferred. Exception is also taken to the classification of magnesite, quicksilver, arsenic, salt, molybdenum, manganese, and other minerals by those who have been actually engaged in those industries. The chairman (Mr. Weld) of the meeting at which this report was adopted, stated, "I think that what Mr. Fox said (regarding manganese) particularly emphasizes the need of a fact-finding committee to establish some of these facts, which will be



done, and we hope these facts will be presented." The membership should not be expected to pass judgment on the report while there is a controversy as to facts; and if the data upon which the committee based its conclusions are in error, then it follows that the conclusions in the report may also be in error. Furthermore if the membership is to judge the wisdom of the report, should it not be provided with the "facts" upon which the conclusions have been drawn?

(2) The characterization "free trade" report is apparently justifiable in a measure only. The report is certainly opposed to a general protective tariff program such as has been advocated in some quarters. There is a feeling that the committee has not met the protective tariff issue squarely. The free trade idea is present by implication, and the statements regarding the subject are either too vague or too general. I should like to see the committee specifically advocate or oppose a protective tariff on the minerals covered by its report. My personal point of view is that a tariff is justifiable in any case where there is a surplus of visible supply in excess of that required as a military reserve, provided that the amount of the tariff necessary to protect the industry is not obviously out of proportion to the benefit to be derived.

(3) If there is to be further "fact finding," the classification of minerals should be reconsidered when that activity has been completed. In this connection the word "supply" should be defined to indicate whether it refers to actual production or potential known supply. It is suggested that the following classes be added:

- (a) Minerals which *exist* in quantities sufficient for domestic requirements and export, but which cannot be exported in competition with foreign sources.
- (b) Minerals which *exist* in quantities sufficient for domestic requirements but which cannot be produced in competition with foreign sources without tariff protection.

(4) If, in reaching a conclusion, we are to consider the welfare of the entire world, the result must necessarily be quite different than if we are to consider the United States alone. I am unable to determine from the report the exact point of view of the committee.

(5) The principle should be recognized that the United States is essentially a producer of raw materials. Cognizance should also be taken of the fact that during the war, machinery of production was erected at many mineral sources, a development which would not have otherwise taken place. Is it the part of wisdom to allow these industries to retrogress to their pre-war status, with the resultant loss of capital and productivity?

(6) Objection is made to such generalizations as "Minerals cannot be created by legislation," in that they are misleading. Mineral industries can and have been created by legislation.

(7) The relation of mineral imports to the international trade balance and creditor-debtor situation should be fully brought out. The conclusions

on this question may also depend upon whether we are to consider the interest of the United States or that of the entire world.

(8) It should be freely recognized that no discussion of Foreign and Domestic Mining Policy can be complete without a full and frank discussion of the tariff issue. There appears to be a tendency to avoid this issue where possible. Doctor Manning has stated that the tariff is a local question. So it is, not only as between states, but between nations. Here again we return to the question as to whether the tariff is to be considered from a domestic or world-wide viewpoint. If from the latter, we may reach the conclusion that the success of Germany's reparation payments to France makes it necessary to close down the American potash plants.

(9) In considering the relation of protective tariff to domestic welfare, the cost to the ultimate consumer should receive consideration. For example, a tariff of 100 per cent might be necessary to protect the producer of a mineral entering into a ferro-alloy, whereas the result, as reflected in the price of a pocket knife or an automobile might range from nothing to a few cents. On the other hand, a tariff levied on manufactured products ready for consumption usually results in a direct and relatively higher cost to the consumer. Hence, a tariff on raw materials is less marked in the consumers' price than that on manufactured goods.

I offer to the committee the following principles for its consideration:

- (a) No mineral should be depleted below a point where there is insufficient supply for military emergency.
- (b) The collateral advantages to be gained by a tariff, such as revenue, employment, production of wealth, taxes, etc., must offset the collateral advantages to be gained by free trade, such as lower prices, adjustment of trade balances, etc.

## STATISTICAL POSITION OF MINERALS FROM AN INTERNATIONAL VIEWPOINT<sup>1</sup>

By G. F. Loughlin<sup>2</sup>

The fundamental relations between mineral wealth and industrial prosperity were not appreciated until forced upon us by the World War and subsequent efforts at readjustment to peace conditions. One of the functions of the U. S. Geological Survey has been to take account of stock of our mineral resources, and its results have been utilized by your Committee on Foreign and Domestic Mining Policies in making its report. In taking this inventory two facts

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<sup>1</sup> Presented at the afternoon session of the Annual Meeting of the Society on January 10, 1922. Published by permission of the Director, U. S. Geological Survey.

<sup>2</sup> Geologist in Charge, Division of Mineral Resources, U. S. Geological Survey.

should be self-evident: first, that the significant measure of mineral wealth is in tons, not dollars; second, that the true limit of mineral reserves is the rate of consumption. Value may express the cost of production or a relation between quantity readily supplied and more or less essential demand, but not necessarily usefulness. The value of precious stones produced and imported annually is considerable, but their usefulness is another matter. It is the quantity delivered to the consumer that keeps industry alive today, and it is the quantity unmined on which the future depends.

In the 40 years that the U. S. Geological Survey has kept records of mineral production, the annual output has increased nearly 17 fold in value, but about 10 fold in quantity. This 10-fold increase is the truer gage of the greater usefulness of the mineral industry. In our weekly reports on coal and monthly reports on oil and cement, the dollar mark rarely appears; their principal features are the quantities made available and the relation of production and stocks to consumption.

During the war, the main question was, "How much have we, or how much can we get?"—not "What shall we pay for it?"; and the classification of minerals by your committee has been based on this same question. According to this classification our mineral resources are divided into four groups:

- A. Those of which we have an exportable surplus.
- B. Those which about satisfy our own needs, but of which there is no appreciable surplus for export.
- C. Those which can supply only part of our needs, and leave us dependent on imports for the remainder.
- D. Those in which we are almost totally deficient, and which leave us entirely dependent on imports.

The following discussion is arranged according to this classification.

## GROUP A

In considering this classification, we must remember that the rapidly increasing rate of consumption of mineral raw materials, even when expressed in tons, is the changing standard by which we must measure our reserves.

*Coal.*<sup>1</sup>—Foremost among the minerals of Group A, of which we have a large exportable surplus, is coal. The bald statement that more than 99 per cent of our country's original supply of coal is even yet unmined does not tell the story as truly as the fact that our most productive and easily mined high-grade coal bed is already one-third exhausted and is being mined faster than ever before.

<sup>1</sup> Discussion of coal furnished by F. G. Tryon, U. S. Geological Survey.



The key to coal economics is that coal is a bulky, low-priced commodity. Transportation costs therefore largely govern its production and distribution. It is certainly true of the world's export coal trade, if not of the internal trade of coal producing countries, that freight rates and transportation charges are more important elements in delivered cost than is the cost of mining. Transportation cost was the principal factor governing the world's pre-war coal trade, although during and since the World War the normal movement of coal has been arbitrarily restricted to meet shortages at home. In the long run, however, even the distribution of coal from Upper Silesia and the Saar Basin is likely to run to pre-war conditions, in spite of changes of ownership and of political boundaries.

The United States possesses more than one-half the world's unmined coal, and contributes more than 40 per cent of the world's production. Counting exports to Canada, our foreign coal trade ranked next to that of Great Britain and Germany before the war, and in 1920 it passed both competitors; but this leadership in exports is doubtless only temporary.

Because of the unequal distribution of coal and its industrial importance, attempts to restrict international trade in coal for any great length of time are impractical. Not only are some countries, like Italy, wholly dependent on imports, but there are entire continents so scantily endowed as to be largely dependent on the nations possessing coal. South American republics are likely to regard freedom to purchase American or British coal as a natural right. These conditions point to a growing seaborne trade for the United States, but we may well inquire whether the tendency should be actively encouraged or merely accepted passively.

Our exports must be divided into landborne (and Great Lakes) trade with Canada and Mexico, and seaborne trade with the rest of the world. Annual exports to Canada range from 12 to 18 million tons of bituminous coal (two-thirds of our total exports) and from 4 to 5 million tons of anthracite (practically all of our exports). Mexico takes only a few hundred thousand tons. Canada's trade is essentially a part of the domestic coal trade of North America and was so recognized during the war. It is as much of an obligation to supply Canada's needs as our own. Furthermore, our north-western states are ordinarily dependent on Canadian coal.

Our seaborne exports in the years immediately preceding the European War averaged about 4,000,000 tons, or less than 1 per cent of our production. In 1915 and 1916, American coal was shipped in increasing volume to South America and the Mediterranean, replacing British coal diverted for war purposes. Our total

offshore exports exceeded 9,000,000 tons in 1915, but were later restricted by submarine activity and declined to 4,000,000 in 1918. They then increased rapidly and in 1920 exceeded 22,000,000 tons—greater than Canada's maximum, and 4 per cent of our production. In 1921 they were 9,500,000 tons, and it is unlikely that the figure for 1920 will be equalled within the next decade.

From the geologic viewpoint the outstanding fact is that our exports comprise the highest-grade coals, of which we have no more than we need. Our great reserves of high-volatile bituminous and sub-bituminous coal, not to mention lignite, which constitute the bulk of our reserves, are too far from the coast to be exported extensively. When we remember that some of the coal of South Wales is within 15 miles of the coast, it is clear that only the eastern fringe of the Appalachian trough can compete in the seaborne coal trade; yet we must rely on this fringe for our low-volatile "smokeless" coal, of which we have no great reserve. Campbell estimates the original tonnage of semi-bituminous coal at 49,000,000,000 tons, or only twice the supply of anthracite. In other words, only 1.4 per cent of our total reserve is semi-bituminous.

Of the 4,000,000 tons of foreign cargo coal in 1918, 3,400,000 was semi-bituminous. The abnormal demand in 1920 accepted high-volatile coals, but even then semi-bituminous coals contributed 8,400,000 tons or 38 per cent of the total. Moreover, only the best high-volatile coals, the high-grade gas coals of southern West Virginia and Pennsylvania, are acceptable for export, and of these we have no great surplus.

Few realize how our present production is concentrated in the high-grade reserves of the Appalachians. About 22 per cent comes from the Pittsburgh beds, which, in Pennsylvania alone has contributed 2,000,000,000 of the 14,000,000,000 tons hitherto mined in the United States. In short, of the easily mined and better quality Pittsburgh coal in Pennsylvania, only twice as much remains as has already been mined, and the remainder is being mined faster than ever before. In the Georges Creek field, practically all of the easily mined coal in the "Big Vein" is exhausted. In the Pocahontas field of southern West Virginia, which contains the finest coal mined in the United States, the former expectations of a supply for five generations has been reduced to three, and will be reduced further if exports are materially increased.

It is frequently urged that an export coal business is needed as an adjunct to foreign trade in general. Undoubtedly American commerce suffers from difficulty in obtaining bunker coal in foreign ports on terms as favorable as those open to British vessels, because of preference shown by the British interests which control the

bunkering stations. As a chain of American-controlled bunker stations would be difficult to maintain without an extensive export trade in coal itself, here is a concrete reason for stimulating coal exports.

At present, with American ships idle, increased export trade is desired; but American ships have little to hope from hauling coal to distant lands, unless return cargoes can be found, and as our foreign trade is already unbalanced in the sense that the bulk of outgoing cargoes is much greater than that of incoming shipments, an increase in coal exports will further disturb the desired equilibrium. So far as shipping is concerned we need more imports rather than more exports. The very richness and diversity of the mineral resources of the American continent hinder our coal export trade, for there is comparatively little of the bulky minerals that we need to import. He who would see our coal entering foreign markets more extensively would do well to stimulate the growth of the steel industry at Atlantic ports. This would draw a supply of ore from South America in vessels carrying coal outward bound. In other words a trade balance in tons must be maintained.

*Copper.*—Copper is another resource of which we have a large surplus for export, but the future of our copper industry deserves careful consideration. Our annual production has exceeded 1,000,000,000 pounds for several years and in 1918 approached 2,000,000,000. Equipment was increased to handle this abnormal quantity, which is about five times the production of 1921 and perhaps one-third greater than normal production. Our consumption of new copper (domestic and foreign) before the war was about three-fourths of our output. Our exports were then double our imports and exceeded our consumption of new copper. Disturbance of these ratios by the war is largely responsible for the unusually depressed state of the industry. During the war copper withdrawn on domestic account rose to nearly nine-tenths of the domestic production. This change was accompanied by steadily increased imports while exports decreased irregularly. In 1918, although our apparent consumption attained its maximum, it was exceeded by our net addition of new copper, and this excess was increased in 1919 and 1920, so that, in spite of our production at only one-third normal in 1921 we still had a large surplus of primary copper at the end of the year, not to mention considerable stocks of secondary copper.

Re-establishment of pre-war ratios depends on three principal factors: revival of foreign markets, competition for foreign markets, and maintenance of domestic production. Industrial recovery in Europe has been progressing, but there is some question whether it will equal its pre-war status. Germany was the principal European customer for our copper, but it appears that part of her apparent



consumption was a gradual preparation for war. Restriction of copper to essential peace uses will considerably curtail her demand. Foreign competition, according to reported plans for increased output in South America and Africa, is likely to increase considerably during the next decade. These developments of extensive foreign deposits will tend to restrict our exports, especially to Europe, but will conserve our own resources. Increased consumption in Asia may be expected with industrial development. An interesting feature of the Asiatic copper industry is that although Japan, a considerable producer, formerly imported only negligible quantities of copper, her imports averaged one-third of her production in 1919 and 1920, when her consumption exceeded production by 10 and 20 per cent respectively.

Our reserves of copper are extensive and will doubtless be increased; but as exploration has been comparatively thorough in the United States our reserves are less likely to be underestimated than are those of the less developed continents, particularly South America and Africa. Estimators of our copper reserves may be divided into three classes: optimists, pessimists, and moderates. Optimists, spurred on by our past achievements are inclined to think there is no limit to the copper that we can produce; pessimists, reasoning from what they know of ore developed and partly developed, and having no faith in future discoveries, see the end of copper mining within the present generation; the moderates, with both extremes in mind and with faith in our resources and resourcefulness, realize that our reserves are not inexhaustible and urge that if our industrial position is to be maintained, American capital must do its share in the discovery and development of foreign deposits, and in the treatment of foreign ore.

*Iron.*—Our production of iron and steel is capable of expansion to meet any demands on it; and it is not dependent on foreign trade. Comparatively little iron ore (1 to 2 million tons) is imported annually, and this quantity is about balanced by exports. The imports are cheap ores from countries deficient in coal and are treated at Atlantic ports. Exports of ore are nearly all to Canada. Our production of ore and pig iron equals our consumption. It is in exports of manufactured products that we attain increasing international importance, and in view of the gradually declining production of ore in the United Kingdom and elsewhere, continued increase in our international trade in iron and steel products is to be expected, although it is subject to competition with the importation of iron ore to British manufacturing centers.

Reserves of ore throughout the world as a whole are ample for a long time. Some concern is felt for our high-grade ores of the

Lake Superior region, and some estimate that if mining continues at the rate maintained during recent years, the known reserves will not last much more than 10 years. It is likely, however, that these reserves will be extended and that the estimated reserves of present commercial grade in the United States will last for 150 years; but with the rapid depletion of high-grade ores the question of competition in foreign trade is one of increasing importance.

*Phosphate Rock.*—Our exports of phosphate rock have been greater in proportion to domestic production than any other mineral commodity except copper, and have exceeded those of metallic copper in tonnage, except during the war. In 1913 nearly 1,400,000 long tons (44 per cent of our production) was exported, and Germany was our largest customer. During the war exports decreased to one-tenth of those of 1913, but in 1920 again exceeded 1,000,000 tons (26 per cent of our production). An interesting feature since the war is the beginning of shipments of Western phosphate rock or derived acid phosphate to Japan, which ranked fourth as a producer in 1919.

Our reserves both in the southeast and northern Rocky Mountain region are measured in billions of tons, but the high-grade rock can not be considered inexhaustible. More important than depletion of reserves, however, is the prospect of increased competition from northern Africa. Tunis ranks second, normally producing more than 1,000,000, and Algeria third with a production of 200,000 to 400,000 tons. Both are controlled by France. Besides these, extensive deposits recently discovered in Morocco are being rapidly and intelligently developed by the French and their output will compete with us for European markets. Phosphate requirements in Europe, exclusive of Germany, in 1919 and 1920 were 2,600,000 tons, and allotments to different countries totaled 1,400,000 tons. The remaining 1,200,000 tons and more can be presumably supplied from Morocco when its deposits are sufficiently developed. Further competition from islands in the Pacific should also be considered.

*Silver.*—Silver is decidedly a North American metal, as regards production and reserves. Mexico, United States, and Canada, together produce about 86 per cent of the world's output. Recent production has been affected by too many abnormal conditions to be of much significance, but available information indicates that Canada's production is not likely to increase, though the new Mayo camp in the Yukon may partly make up for the very rapidly decreasing yield from Cobalt. Mexico's output will increase with more stable conditions. Our own production is largely from copper and lead ores and is affected by the lead and copper markets. Our silver

reserves are also closely associated with those of base metals, and the same caution applies to their development. Reserves of silver-gold ores though considerable are not so abundant that we can depend on them for maintaining our recent normal rate of production especially when the silver will have to be sold to consumers other than the United States Government when the purchases under the Pittman Act are completed, in about two years. Mexico's reserves are by far the largest in the world.

In South America, Peru and Bolivia have the largest production and reserves. Australia is next, and Japan is next with about 4 per cent of the world's production. Japan has been importing considerable silver, but India and China are the well-known principal consumers.

As silver's main function is a medium of exchange large exports from the United States in normal times are inevitable, as less than one-half the domestic silver output is normally used for coinage or in the arts and industries.

*Sulphur.*—We are by far the leading producer of sulphur, and in 1920 made a record shipment of 1,500,000 tons. Our exports increased four to five fold during the war and continued to increase since, attaining a record quantity of 477,000 tons in 1920. Our reserves are considerable, but as a measure of conservation the recent displacement of pyrite by sulphur in the manufacture of sulphuric acid is of interest. This change is to the present advantage of manufacturers, but hastens the depletion of high-grade sulphur deposits. Recovery of sulphur from sulphide ores for the manufacture of acid could be increased, but is evidently not yet sufficiently economical to compete with the production of native sulphur.

*Borax.*—Our borax industry is now almost exclusively domestic. Since 1909 imports have been negligible. Of our maximum production of 120,000 tons in 1920 only 7,000 were exported. Our reserves are extensive and some are within short enough distance of Pacific ports to deserve more consideration in foreign trade as demand arises. Borates are produced in South America, principally in Chile, and exported to Europe. Italy is an important exporter, and Turkey also exports to Europe, which is evidently not in serious need of American borax.

*Summary.*—Of the members of Group A, increased exports of coal and copper are likely to result before many years in a shortage of high-grade material available for domestic use. Exports of iron, phosphate rock, and sulphur are more easily spared and their future volume depends primarily on foreign competition. An adequate foreign market for borax remains to be developed.



## GROUP B

The minerals listed in Group B, with which we are well supplied but of which we have no great surplus or deficiency, may be considered in sub-groups: (1) those of which we could produce a surplus for export if the rest of the world were not so well and cheaply supplied; (2) those of which we can produce sufficient for our own needs only when cheaper imports are not available. Were these materials all concentrated close to our seaports the story might be different, but the United States is too extensive and too much affected by costly transportation. The Pacific coast region has been called a different industrial country from the rest of the United States, and the inter-mountain and Great Plains states are in some respects to be similarly regarded. Our Atlantic and Appalachian provinces are more closely connected commercially with other continents than with other parts of our own country, when trading in these minerals is considered.

*Sub-Group 1.*—The first sub-group includes building material (cement, gypsum, lime, magnesite in part, stone, sand and gravel); also salt, magnesite for refractories, tripoli and diatomaceous earth, zinc, lead, cadmium, molybdenum, and titanium.

Our cement materials are abundant and widely distributed, and a few years ago there was talk of increasing our exports of cement to Latin America; but the growing demand has been supplied in part by the erection of cement plants in these countries, where raw materials are also adequate. Since the deposits in Washington were discovered, there has never been any acute domestic shortage of magnesite suitable for all purposes; but the deposits are all on the wrong side of our vast country to supply the principal domestic markets. Our production of magnesite and its war-time competitor, dead-burned dolomite, supplied all our increased needs and far exceeded our usual quantity of imports of magnesite, but resumption of imports in 1921 has been accompanied by the closing of all magnesite mines.

Our quarries and stone-cutting plants are capable of supplying extensive foreign markets with excellent building and monumental stone, and exports of these have increased somewhat, particularly to South America; but competition among building materials is so keen that producers devote their energies to fighting for domestic markets. The only considerable imports of building materials have been Italian and French marbles, which find favor among architects. While not absolutely essential, they have contributed from 20

to 40 thousand tons or more annually to the return cargoes for our more essential exports. Some apprehension is felt among our stone producers that imports of building stone and even of paving stone will soon be serious competitors for markets on our Atlantic coasts. It is said that English limestone can be loaded in New York for less than the cost of freight to New York from Indiana, our principal producer of building stone, and that Scandinavian granite for monuments, building, and paving can undersell even our Eastern granites. Owing to the general depression at home and abroad this threatened competition has been delayed, but, unless freight rates are sufficiently reduced, it may be felt in 1922 which is starting fairly well for the building industries.

Our imports of salt are mainly to Atlantic ports and are brands to which users are too accustomed to wish a change. Our own supplies are vast and well distributed. Our supplies of tripoli and diatomaceous earth are also vast, though less evenly distributed, but production from 1918 to 1920 increased nearly four fold, from 23,000 tons to 83,000 tons, while imports remained less than 2,000 tons. No exports were recorded, presumably because there is no foreign demand.

Our production of zinc nearly doubled from 1913 to 1916, when it was 668,000 tons—50 per cent more than we consumed. Ordinarily the foreign demand for our zinc is comparatively small, whereas competition with Mexican ore for our own markets is considerable. In 1913 exports were only 7,000 tons while imports were 6,000 tons. In 1921, owing to the condition of the world market and to rates of exchange, about 14,000 tons of foreign slab and sheet zinc were imported. For the same reasons 8,162 tons of domestic zinc were re-imported in 1920 and 731 tons were re-imported in the first quarter of 1921. Our zinc industry, therefore, is primarily a domestic one, although the war proved that we can produce a large exportable surplus when necessary; in fact, an overproduction when the foreign demand was greatest caused the zinc market to collapse long before a general depression was suspected.

The same remarks regarding ability to produce apply in less degree to lead. In 1916 we exported more than one-fifth as much as we consumed, though our normal exports are nearer one-tenth of our consumption. Lead is too widely distributed to create a large foreign demand.

Arsenic, bismuth, cadmium, molybdenum, and titanium, though produced in comparatively small quantities, more than supply the demand. Arsenic and bismuth, smelter by-products, can be produced

in excess of demand. Considerable cadmium was exported during the war, mainly to France; but, as cadmium is a by-product of zinc which is well distributed throughout the world, there is little expectation of a foreign market. A few molybdenum mines were extensively developed during the war in anticipation of a market which did not materialize. Our supplies would be ample to supply a considerable domestic demand and a foreign demand as well. Our titanium supply is at present produced from rutile by one company. We have practically no imports or exports. Titanium in titaniferous ores is ample, should a considerable demand arise.

*Sub-Group 2.*—Sub-group 2 of Group B includes bauxite, emery, asphalt, barite, bromine, feldspar, fluorspar, fuller's earth, gold, oil, pyrite, and talc. Of these emery and talc are adequate in quantity, but are inferior to the finest foreign grades. Bauxite, barite, fluorspar, feldspar, fuller's earth and pyrite are adequate in quantity, but all except fuller's earth are not properly situated to control Atlantic coast markets under normal conditions in competition with French and South American bauxite, English fluorite and barite, and Spanish pyrite or Gulf Coast sulphur. Our resources in fuller's earth appear to have been underestimated. Production has increased steadily from 1913 to 1920 and made its greatest gains in 1919 and 1920, while imports remained about stationary. Imported fuller's earth continues in demand for clarifying edible oils and greases, as it is superior for these uses, whereas domestic fuller's earth is used principally for mineral oils, though its use in the edible oil industry is increasing. New deposits of fuller's earth have been opened in the West, and if a foreign demand arises our deposits may prove equal to the occasion.

*Oil.*—Oil and asphalt, though listed in this group are two commodities in which we are actually deficient, under present commercial conditions. As most of the asphalt produced in this country is a by-product of petroleum it is a part of the oil problem. This deficiency is claimed despite the statement in 1918 that we possessed an exportable surplus of oil, and in 1921 made a record production. The outstanding feature of the international situation in oil, insofar as the United States is concerned, is our excess of consumption over production and the improbability that Mexican production (175,000,000 barrels in 1921), which is the only source of our imports, will maintain its present rate much longer. Temporarily at least, Mexican production, four-fifths of which came from the Tuxpam zone in 1921, may fall to comparative insignificance; and the United States, which took 78.6 per cent of Mexican exports in 1921, will



have to look elsewhere to make good the deficiency of its own production, which was about 50,000,000 barrels below consumption in 1921. Although our stocks are now the greatest on record (195,000,000 barrels on Jan. 31, 1922) this supply is sufficient for only four months' consumption at the present rate.

To maintain the present rate of consumption United States capital may be forced into even greater competition with British and Dutch companies in foreign fields, and unless some agreements are reached, friction which has recently developed between the countries over the oil question may increase. The international oil problem is of all mineral problems the most serious to the United States. We supplied our allies during the war by intensive production, only to be faced with a shortage four years later.

Petroleum geologists are not unanimous in estimating our petroleum reserve. A committee composed of members of the Association of Petroleum Geologists and of the U. S. Geological Survey has recently estimated that the quantity of oil remaining in the ground in this country Jan. 1, 1922, and recoverable by methods now in use amounted to 9,000,000,000 barrels, or enough to satisfy present requirements of the United States for 20 years, if the oil could be taken out of the ground as fast as wanted. The committee, however, emphasizes the fact that the reserves will not be exhausted in 20 years, as discovery, development, and production can not proceed fast enough. This estimate is based on much more complete and reliable data than was possible for previous estimates. The country's rate of production is therefore likely to decrease and dependence on foreign oil likely to increase. Criticism of this estimate maintains that attempts to guess the quantity of oil in undrilled fields are not worth while. The estimate of 9,000,000,000 barrels is admittedly subject to revision as more knowledge of reserves accumulate; but from the ratio of consumption to domestic production, as shown by monthly reports of the U. S. Geological Survey, it is evident that only in periods of industrial depression can we produce fast enough to supply all our requirements. Increase in our oil reserves will not decrease the importance of the international oil problem.

*Gold.*—In production of gold we rank a poor second to South Africa, and the British Empire, including South Africa, Australia, Canada, and India, controls the greater part of the world's production. Mexico ranks third and Colombia fourth. Our production has declined steadily since 1915 and is now about one-half of what it was then. Although some mines have been worked out, the principal cause of decline has been the fixed price of gold while cost of

production has more than doubled. With return to normal conditions production will begin to increase, but unless costs drop to pre-war levels the fixed price of gold will preclude the mining of as low-grade ore as was possible before the war. The richer gravels are rapidly being exhausted and the output from gold dredging is decreasing rapidly. While some gold is recovered in the mining of base metals nearly all of it is derived from gravels and from gold or gold-silver ores, so that any increase in copper or lead mining will have little effect on gold recoveries.

Annual imports and exports of gold exceed domestic production. Imports consist mostly of foreign refined bullion and foreign base bullion. Exports consist mostly of domestic refined bullion and United States coin; but in 1920 foreign refined bullion that was re-exported slightly exceeded United States coins. The use of gold as a medium of exchange and as standard currency by many countries necessitates large exports and imports to maintain a balance of trade in dollars. As it is the standard currency in the United States the values of all other materials should, with the return of normal industrial conditions, readjust themselves to the supply of gold, and the exact amount of gold in coins is of less importance than its ratio to paper currency and commercial paper.

The amount of new gold used in the arts and industries in 1920 was more than the domestic production for that year, and the amount of new and old gold so used in 1919 exceeded domestic production by 25 per cent. These ratios are proof that our reserves of gold ore do not exceed our own requirements, but as some of the industrial uses can not be considered very essential to the country's existence, when necessary gold can be diverted from such industries to coinage. Gold in coins and jewelry is not so much a wasting asset as are many commodities. There is but one crop of ore, but the gold from it can be used over and over, its accumulation more than offsetting losses. A country with gold can obtain other supplies, but a country with other supplies can obtain gold in exchange for them. The United States has both, and the lack of excess reserves of gold in ore is therefore not of so much concern as similar lack of any of the important fuels, base metals, or fertilizers.

## GROUP C

Group C, comprising minerals in which we are deficient, is comparatively small, and only one-fourth of its members are bulky commodities imported in large quantities. The bulky commodities are high-grade clays, chalk, chromite, and manganese. We man-

aged successfully during the war when our foreign supplies of these materials were curtailed, and it is possible that our own clays and chalk could give satisfaction if we had to depend on them. When our supplies of English and German clays were cut off we found that some of our own were adequate substitutes, but the war did not last long enough to demonstrate whether we could utilize our own ball clays and kaolins exclusively. At present our pottery manufacturers are accustomed to English clays and so long as they get better results from them will demand them. A little comparative study of foreign and domestic clays has been made with interesting results, but considerable more is necessary before we can determine whether or not domestic clays can be so treated as to substitute satisfactorily for foreign clays. Our chalk deposits are too far inland to compete with English chalk in Atlantic coast ports, and therefore have never been adequately prospected or tested. During and since the war quantities of pulverized limestone and marble were used as a substitute for English chalk with considerable success, but consumers preferred real chalk. Occasional inquiries regarding domestic chalk deposits are made and suggest that a high-grade domestic chalk or material of similar physical and chemical properties procured at reasonable cost would find a market. Domestic chromite and manganese deposits can supply much, if not all, of our demand if no imports are available, but our deposits are small, prevailing of low grade, and not favorably situated, and our known reserves could not supply us for many years; whereas chromite deposits from India, New Caledonia, Rhodesia, and recently Cuba, have furnished three-fourths of the world's output, and India, Russia, or Brazil could each supply the world with manganese for at least 50 years from their known reserves. Competition with these great foreign resources cheaply mined and transported to our Atlantic coast is practically impossible, and imports of these important commodities are to be regarded as among the natural return cargoes in ships which carry our exports of coal, and other exportable commodities. Our future recovery of nitrogen from the air will depend in part upon competition with the large imports from Chile.

The remaining members of Group C are numerous, but a detailed review of them would only repeat the main points already considered. In general the quantity is nearly sufficient in an emergency, but the quality for the most part is inferior to available foreign supplies, or the cost of getting it to the consumer is too great to permit competition under ordinary conditions. Graphite is an illustration. Tungsten is another. We could perhaps be independent



in these resources, at least for a few years, and we could individually, if we had to, saw wood to build our own houses, but would the time consumed and the quality of the work pay? With quicksilver our supply is of prevailingly low grade and costly. Mica is perhaps a little nearer to Group D. We have sufficient medium to low-grade material, but have not yet demonstrated that we can supply ourselves with enough of the highest grade. With potash the case is somewhat different, as our reserves on the whole are comparatively great. Our potash industry is truly an infant industry of such possibilities as to warrant special attention. Producers hope that with continued improvement in production and refining they will be able in five years to compete with foreign producers in the open market. If we can thus supply ourselves from the known reserves of our saline and other deposits, we can surely keep the price of imports down to reasonable levels.

### GROUP D

Little discussion of the minerals in Group D is worth while. Exploration has thus far shown us hopelessly deficient in them. Some, like nickel and cobalt, are obtained by land-borne traffic and help to balance our exports of coal to Canada. Platinum helps to balance our trade with Colombia, but in dollars rather than tons, and Bolivian tin ore, smelted in the United States, has been increasing our balance in tons as well. Imports of Bolivian tin ore which began in 1915 amounted in 1920 to 34,000 tons. Imports of metallic tin from all countries in 1920 were 63,000 tons. Whereas we are almost destitute of tin deposits, large stocks of tin are being held by the Netherlands East India government and the Federated Malay States.

### OUTLOOK FOR THE UNITED STATES

Our position in the mineral industries, in brief, is serious shortage of a few raw materials, adequate supply of many of which are limited to domestic trade, and surplus of some of the most abundant and important in the industrial world; but this abundance is being rapidly drawn upon. In the last 15 years we have mined and smelted more lead than in the nearly two centuries before; in the last 13 years more coal, and in the last 11 years more iron ore than in the whole century before; in the last 9 years more copper than in the 67 years before, and in the same 9 years more zinc than in the 54 years since zinc mining began in the United States. Most thought-provoking, however, is the fact that our country has produced more petroleum since the outbreak of the World War than in all the years

before August, 1914. In terms of these  $7\frac{1}{2}$  eventful years, American petroleum is truly a shrinking asset.

Our country is blessed beyond all others in its abundance and variety of minerals, yet even the United States is not self-sufficient in minerals, nor is its supply inexhaustible. It is in the frontier countries and continents that we can expect mineral discoveries on a scale that will keep pace with the world's increasing consumption. Some apparent increase in our mineral supplies will result through greater conservation in consumption and production; but inventions and improvements in mining and metallurgy can hardly equal the world's ever-increasing requirements of mineral products.

As recently stated by George Otis Smith, our country is continent-wide, a fact that hinders national vision. Political boundaries can not obviate the operation of natural and economic law—the limitations of distance and the cost of transportation—and our own ores may be less accessible to our furnaces than similar ores in another country. The long haul is distinctly an American problem.

A national policy must include in its field of vision the international aspects. Our shortage in a few essential minerals and our surplus in others make exchange with foreign countries necessary, and it is a business problem whether self-dependence in many more mineral products is desirable or profitable. Each ore deposit has its own place in the world economy and therefore its day for profitable exploitation. To learn all the facts and to weigh those facts accurately is the first step towards a wise mining policy and a safe business procedure.

The world movement of minerals is guided by supply and demand, and the steady increase in international exchange of mineral commodities should bring the nations of the world closer together.

Our abundant cheap power, based on coal, oil, and water, means high productivity for labor, the possibility of low costs and high wages, and the promise of industrial progress and national prosperity. Such a view of our immediate future is warranted by the facts of our national resources, but our outlook must be broad enough to include the whole world. The greater our industrial development the greater need we shall find for foreign sources of raw materials and for foreign markets in which to sell our products. American capital must realize its obligation to insure the future by reaching out into other lands for the commercial control of both mines and markets. That kind of pioneering may be not only peaceful but helpful to the peoples of frontier countries. Already the day has arrived when no nation can live unto itself.

Discussion of G. F. Loughlin's Paper

**J. E. Spurr.**—Doctor Loughlin's paper is a very distinct contribution to the study we are making of correct governmental policy as regards the proper and efficient management of our mineral resources, and the manner in which we should co-operate with other countries.

We have only made a beginning in endeavoring to outline the fundamental principles which should underlie our policy, and Doctor Loughlin emphasizes the correctness of those stated by the Committee on Foreign and Domestic Mining Policy in its report. This paper goes somewhat further in setting out additional fundamental facts and paves the way for a further statement of them as our great fact-finding body, the U. S. Geological Survey, progresses with its work.

Doctor Loughlin particularly emphasizes what we should all realize; namely, that the mining industry in this country is not a single entity, but that we have a group of mining industries with conditions peculiar to each of them. In the various cases the underlying facts must be different and the policy must vary in accordance with them.

In planning to continue the work of the Committee on Foreign and Domestic Mining Policy it would appear that this can best be done by taking up each of these specific mineral industries by itself. It was with this idea in view that I appointed a special petroleum committee as a sub-committee to deal with this subject.

**Arthur Thacher.**—I think one of the closing remarks of the paper in regard to the doubling of consumption in the last ten or fifteen years should be emphasized. It is immaterial whether the period be nine, twelve, or fifteen years; the important thing for us to look at is that though many of our metals have been known since Biblical times, the world did not use them, and we need go back only 50 years to see that the total production from all our mineral resources was insignificant. Since then tremendous development has taken place, and every nine, ten, or twelve years we see production doubled, this doubling including the production of all prior time. An objection may be cited in that the last seven years have been war years, but if we take the period of 1870 to 1913, we will find the same progression was taking place. Looking to the future, we know that in most of the highly civilized countries the saturation



point of consumption has not yet been reached and we have the vast hundred million of backward peoples still to be provided for as their development progresses. Therefore, though we may say we are now in a time of depression, we may expect that in the next ten or fifteen years we shall again produce more than in all time past. If I remember correctly the census of 1870 placed the value of our mineral production at \$152,000,000. For 1920 the figure is, I believe, \$6,900,000,000. Allowing for the inflation of prices, and placing the figure at \$5,000,000,000 it will be seen that we have almost an exact doubling of production every ten years from 1870. It is immaterial whether the progression in the future continues at exactly the rate of the past, but it is surely evident that in the next ten or fifteen years we are going to call upon our mineral industries for a production that is staggering to contemplate.

**W. R. Ingalls.**—Mr. Thacher has just made some remarks that remind me of Doctor Loughlin's discrimination among pessimists, optimists, and moderates. I believe that Mr. Thacher will not dissent from my characterization of himself as an optimist. I do not wish to express an opinion myself, either as a pessimist, an optimist, or a moderate, but I wish to tell you what is the pessimistic thought as the antithesis of the optimism expressed by Mr. Thacher. This is, I believe, the foreboding of Ferraro, the Italian historian, who foresees the possibility that the civilized world may now be entering upon a period of decay similar to that which the Roman Empire experienced in the third century. This is pessimism indeed. If anything of that kind is going to happen, no forecasts of increasing requirements for minerals in geometric progression will apply.

What impressed me most in Doctor Loughlin's very able paper was a remark towards the end of it that the first essential in the consideration of these problems is to ascertain the facts, to learn how to measure them, and upon the determination of all the actualities, create the basis for intelligent determination of foreign policy in respect to all minerals. With these facts determined the problem becomes one for the economists to advise about, and it is for the statesmen to act upon their advice. The function of this Society, I think, ends with the determination of facts. That is peculiarly within our province. In such determination of facts we have two classes of work to do. One is the work of the geologist in informing

us as to the nature and extent of our resources. The other is the work of the technologist or the industrialist who adds his own knowledge of industrial affairs.

To cover the minerals on Doctor Loughlin's list, I think that among our membership can be found at least one specialist in every case. I therefore believe that this work of the Society should be performed through the functioning of a great many committees—as many as there are minerals on the list. The membership of these committees will vary in number, from only one to maybe five or more men according to the conditions in each case, and through their work we can present a complete statement of the facts. With the presentation of these facts before the whole membership of the Society for discussion, criticism, and general testing out, the work will crystallize into something that will be of extraordinary value.

**J. E. Spurr.**—Dr. John E. Teeple will present to us some considerations concerning the economics of the potash industry.

**John E. Teeple**<sup>1</sup>—The U. S. Geological Survey lists potash as one of the mineral resources in which the United States is lacking and it is given in the report of your Committee on Foreign and Domestic Mining Policy<sup>1</sup> under Class C, covering minerals existent in the United States in inadequate amounts.

In recent years considerable work has been done in the development of natural deposits of potash in the United States; I am personally familiar with the work done in California at Searles Lake. Up to 1916 there had been no production of any consequence and it was not until that year, I believe, that our production reached a figure over 1000 tons. By 1918 the development of the industry resulted in a production of 54,000 tons of actual potash (i.e., actual  $K_2O$ ) amounting to about one-fifth of the country's normal consumption which, prior to that time, had been imported into the country, chiefly from Germany. These imports came in the form of about one million tons of ore containing 25% of available potash. This really rapid development was interfered with by the termination of the war and production has since fluctuated. In 1920 it amounted to about 50,000 tons.

We are now faced with the question of whether a real potash industry can be developed. The answer seems to depend upon three conditions: First, the quantity of available

<sup>1</sup>Consulting Chemical Engineer, American Trona Co.

supply of raw material; second, the quality of material that can be produced; third, the price at which it can be marketed.

During the years 1912, 1913 and 1914 a great deal of work in developing methods of production was done. The problem is more one of manufacturing than of mining, the method of extracting the raw material consisting merely in boring a hole about 60 ft. deep into a loose deposit of material out of which brine is pumped.

As to the quantity available in the one lake which I have mentioned in California we believe we have enough to supply the country, at its present normal consumption, for about 75 years, or a total of about 20,000,000 tons of actual potash.

There are in addition other deposits in the United States and a considerable amount is being produced as a by-product. We therefore believe we can now see an amount sufficient for 100 years' consumption.

During the war, people were urged to investigate sources of potash and push its production with the idea that if potash were present impurities would not be an objection. Under this urgency a great deal of material was put out that contained other substances and was not of a quality that would now be considered satisfactory, one of the main complaints being the presence of borax. This difficulty has been overcome and practically all of the agricultural experiment stations that have investigated the domestic material within the last two or three years have stated that the product was of a very high degree of purity.

As to the price at which domestic potash can be marketed—at the close of the war investigation work necessary to perfect processes and establish costs was not completed and we have therefore asked Congress to give us protection over a five-year period until we can finish our research and development. We have assured them that if this is done we can in that time establish a permanent potash industry in this country that will supply the quantity needed of quality as good or better than is now available, and at a lower price.

We have asked for a duty per unit of 1%  $K_2O$  per ton of: 50c. the first two years; 40c. the third year; 30c. the fourth year; 20c. the fifth year; nothing thereafter. The matter is now before the Senate.

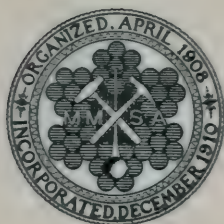
While the costs of production in this country are high, our experience indicates that they can be greatly reduced. Placing the cost of our production in 1919 at 100%, the work done in



the first four months of 1920 showed a reduction to 58%, and in the first four months of 1921 this had been reduced to 32%. The same is true of producers who are producing potash as a by-product. Taking their 1919 costs at 100%, they were reduced to 50% in 1920, and to 25% in 1921. The work is progressing but is not yet finished. A few years ago, in the evaporation of our brine we required 1500 gal. of fuel oil to produce one ton of potassium chloride. We have now practically cut this to 200 gal. and are in hopes of cutting it in two again. We have reduced our labor cost and expect to reduce it still more. I see clearly that if we are given five years in which to develop we will be able to produce the quantity required at strictly competitive prices. Up to the present prices have been falling faster than our production costs have been decreased. This is why we ask for a temporary tariff.

I am placing these facts before you because we are facing a rather insistent propaganda fathered by an advertising agency company in this country which persists in assuring the public that we have not the quantity, cannot produce the quality, and can never compete in price. I wish to assure you that all of these statements are incorrect. From working in the industry for several years I feel safe in assuring you that all we need is further time in which to develop. You all know that when plants are closed down it is very difficult to keep research and development organizations at work. If your mine closes and your sales stop, this is usually the first department to be curtailed. Up to the present we have kept the research work going without any loss whatever and we expect to continue this. I trust that when the time comes for you to look into this industry as you are looking into others, you will get at these facts and not be influenced by the propaganda that is being put out. It comes at times in interviews with college presidents, sometimes from bank presidents, and I see the same figures emanating from many different sources.

# Mining and Metallurgical Society *of America*



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# Mining and Metallurgical Society of America

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## DISCUSSION ON REVISION OF THE MINING LAW

By the New York Section, Feb. 14, 1922

At a meeting of the New York Section held at the Harvard Club, New York, on Tuesday, Feb. 14, 1922, the question of revision of the mining law was taken up. The chairman of the Section, Mr. C. M. Weld, presided and introduced as the first speaker, Mr. F. F. Sharpless who was very intimate with the history of the bill introduced by Congressman Arentz, and hence well qualified to lay a foundation for the discussion.

**F. F. Sharpless.**—It may be well to go over what has happened in the past in respect to modifying the law so as to bring it up to date, as it may give us a better conception of the situation. Other members may speak about special features of the law if they wish to do so. First, I think it might be well for us to consider why we as engineers in the East have any business in speaking of affairs that are so intimately connected with the Western states, since some of our Western friends have intimated that we are really butting into something that is none of our affair. Fortunately it is only a small proportion of the Western engineers who have that view. I believe that they very largely feel that they have found out the difficulties that exist in the present law, and they are very glad to have us take a sympathetic interest and an active part in assisting in changing those features that are not entirely satisfactory.

We are interested from another standpoint; we have a personal motive. We are all interested in it because we are nearly all interested in Western mining operations; we are interested from the fact that we all want to help the mining industry to progress and we feel that we can do so by slightly altering some of these laws. Some of us are more closely identified with the financial side of the business than the operating side, and from that angle we get another view. We feel that we can be of

some help in the consideration of mining laws because we see the difficulties due to the existing laws that confront those who have the financing to do.

In some of the criticisms that come to us from the West we see that those who favor the existing laws advocate that they suit the prospector; that he is satisfied with them and wants no change; and the published letters of the prospectors that we have seen in several of our Western papers indicate that this is true. Letters offering objections to the repeal of the apex law, the matter of discovery, the manner of locating claims, and the paying of money instead of doing assessment work, very frequently have been signed by the prospectors, and if it were the prospector who made the mine by his discoveries, what he has to say might guide us to a very great extent in determining what is best, but we all know that it is not the prospector who alone makes the mine, but the financier and the engineer and the prospector together, and often it is 10% of prospecting and 90% of financing and engineering.

Those of us who are called into a consultation are frequently called upon to decide, not as to whether there is ore or no ore on the property, but further than that, if there is ore, can we make a mine out of it. The first question can often be answered quickly, but the second one offers many difficulties, and it may be that we turn down the proposition solely because of the uncertainty of the title or the legal difficulties involved. If the prospector would only stop and think that the engineer is not his enemy but his friend, that it is to the advantage of the engineer to find something that is worth while, that the engineer's bread and butter is dependent on what he finds, that the engineer is ready to take a long chance if he can see any possible chance of making good, it would be most fortunate; but too frequently, pretty nearly always, the prospector has the idea that the engineer is his particular enemy and has come for the purpose of turning his business down.

If we could convince the prospector of the difficulties that beset us when we come to give his property consideration, I am sure that he too would be quite ready to take into consideration what the engineer has to foresee, and realize that his views ought to be considered as well as those of the man who does the finding of the prospect in the first place. It is not a question of the prospector versus the operator. We do not represent the prospector or the operator, but we do represent the industry, and in representing the industry I think that we have every

reason, through our experience, to indicate some of the difficulties that are besetting both the prospector and the operator.

It was away back in 1908, soon after this Society was formed, that a group of men got together and were talking over what field this Society might cover. They had in mind, among other things, the alteration of the existing mining laws which was first crystallized in a letter written by Mr. Ingalls on June 28, 1911. He wrote a letter to the Council suggesting that the work of the Society should be conducted very largely by committees and one of these committees ought to have under consideration some of the archaic mining laws to see if they could not be brought up to date. This letter was received by the Council and was sent out to a number of our members. Mr. Winchell responded to the letter only a short time afterwards, and I quote from his letter as follows:

I am particularly interested in the proposal to amend the present mining law of the United States, and would be glad to co-operate with other members of the Society in promulgating information which will tend to show that this law is not favored by the majority of mining men who are well informed, and that it leads only to litigation and expense.

At about this time the American Mining Congress gave cognizance to this subject and it appointed a committee, the chairman of which was Mr. E. B. Kirby. On Nov. 4, 1911, Mr. Kirby came to one of our meetings and he told me what the Mining Congress was doing at that time or what his committee was doing, pointing out that the agitation for the revision of the mining law had been going on since 1897 and that nearly every year some bill had been presented to Congress and changes suggested, but none of these bills had been pushed with any vigor for fear that in opening the question the whole subject would be opened and a bad matter would be made worse. They urged at that time the view that the Mining Congress should ask Congress to appoint a commission and to consider the revision of the law entirely from top to bottom.

The Mining Congress plan was to secure a carefully selected commission which would go around the country securing all the evidence it could from various districts, from prospectors, from operators, from geologists, from mining engineers, and then formulate a bill and bring that before Congress in a finished form. Just after Mr. Kirby made this statement the Society appointed its first committee, of which Mr. Winchell was chairman, and Mr. Goodale and Mr. Requa were members. The first thing that committee did was to send out about a thousand letters to miners and mine operators all over the country, try-



ing to reach those who could intelligently give some expression to their views in regard to the existing law and what changes ought to be made. This letter opened by pointing out the difficulties that the members of the committee themselves knew. It pointed out that already the Director of the U. S. Geological Survey, various Secretaries of the Interior, Congressmen and even a Presidential message had considered a revision of the law. The committee received a large amount of advice in answer to these letters, which asked for an expression of opinion on four subjects, the last one of which was in regard to the apex law. A great number of replies were received to the effect that if anything at all was done to the mining laws, the present apex law should be repealed.

On March 15, 1913, a year and a half later, the Committee on Mining Law made its first formal report. In this report particular attention was given to the existing law which requires the discovery of veins or ledges of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, until which the prospector is an unlicensed, unauthorized, unprotected trespasser. Attention was also drawn to the difficulties surrounding the location of lodes in placers and the injustice of allowing a prospector to locate an indefinite number of mining claims. The faulty manner of recording claims was correct, but the greatest weight was placed upon the absurdities of the existing lateral-rights principle. The committee submitted ten propositions or ten questions for the Council to take under advisement. The Council considered them and sent out a letter containing these ten propositions which most of you will remember in a general way.

The first one was to the effect that the mining law should be revised, not piecemeal, but thoroughly, so as to coordinate and harmonize its various provisions; the others referred to the placer claims; the method of location; the provision for working petroleum, phosphates, haloids and other mineral substances not specifically mentioned in the present law; the privilege of appealing to competent courts; and finally, for the purpose of giving the fullest consideration to the needs of every branch of the mining industry and every section of the country, it was stated that it was desirable that a Government commission be created by act of Congress, whose duty it should be to investigate by every proper means the questions and interests here referred to and to make recommendations as a basis for the proposed mining law.

These resolutions were prepared only after three years of

work in gathering material with which to help solve the questions. They were printed in Volume VI of our Bulletin. The letters received cover something like two hundred pages, and strange to say, the recommendation of the committee of the Mining Congress, published in the same volume, is almost identical with that of our committee working independently. Both arrived at practically the same conclusion; namely, that the whole mining law should be revised, that it should be done by Congressional act, and approved by the President. The report of the committee was concurred in practically by the Montana Mining Society, and there were four other Western organizations at that time that concurred in it, but the Committee on Mines of the Seattle Chamber of Commerce, bearing in mind the result of the Pinchot campaign in that country, opposed any legislation whatever for fear that it would open up questions and that they would get legislation in respect to mines which resembled very closely the legislation that followed the campaign of Mr. Pinchot with respect to timber and coal, etc.

The answers to the various questions developed this fact—that on many questions there were differences of opinion and that there were good reasons for them in different localities, but there was uniformity in the opinion that the whole business should be revamped and that it should be done, not by mining engineers, but by Congressional enactment. Of the ten questions submitted by the committee seven were given almost unanimous approval by members of this Society, and just after we had taken our vote Senator Smoot, on March 16, 1914, introduced a bill for a commission to consider and suggest amendments to the general mining laws. That bill was passed in the Senate and when it reached the House on April 1, 1914, Mr. Taylor, of Colorado, introduced practically a similar bill in the House which got as far as the Committee on Mines and Mining but died there. The chairman of that committee at that time, Mr. Foster, was not particularly keen on this commission idea, and several other bills that got as far as his committee also died there because they were not pushed and because the chairman of the committee was not particularly interested in them.

With these experiences confronting them, the committee, in February, 1915, recommended that the whole thing be brought forcibly to the attention of Congress by means of a convention of mining men representing all parts of the country and all shades of operators. It was suggested that the convention should be held in Washington in order that we should have an opportunity to talk with and tell our Congressmen and Sena-

tors what our troubles were, and see if we could not get them to take favorable action. The committee's report was acted upon favorably by our Council and we found that the Bureau of Mines, the Geological Survey, the Secretary of the Interior, Congressmen and Senators approved and were ready to help us. Every mining organization west of the Mississippi and a good many of those east of it were addressed by us in respect to this matter. We sent them copies of our resolutions, all the arguments we could find for and against those resolutions, and asked them if they would not take part in such convention, either objecting to or supporting the resolutions, as their districts might direct them. In order to reach everybody, the Bureau of Mines, of which Dr. Manning was then Director, very kindly sent out over ten thousand circular letters, many of them to men who had no connection with organizations. Hundreds of answers were received to those letters, which were carefully sorted and tabulated by the Secretary of the Mining and Metallurgical Society. Less than 5% indicated opposition to the seven propositions of the Society, and less than 1% approved of the existing lateral-rights principle of our mining law. These letters went to high and low. Some of the answers did not assay very well in English or orthography, but they did assay well in intelligence, and it was not only operators, but prospectors as well, who had seen a good many difficulties from time to time, and they were just as anxious to get these difficulties straightened out as were the operators.

This led finally to a convention which took place on Dec. 16, 1915. There were with us the American Institute of Mining Engineers, the American Mining Congress, the Idaho Mining Association, Montana Society of Engineers, California Metal Producers Association, Nevada Mine Operators Association, and the Colorado Scientific Society. Altogether 34 organizations were represented and in addition there were a great many people there representing only the mines or representing themselves without any attachment. It was a pretty thorough representation of West and East.

Three sessions were held and addresses were delivered by Congressmen, members of this Society and members of other organizations, and although these seven propositions of the Society had been approved, the Council recommended at that time that we present to the convention for consideration only two propositions—the first, that the work should be done thoroughly by going over the whole law, and the second, that a committee should be created by Congress to investigate and recommend



the basis for proposed revision. Resolutions from half a dozen other organizations, all of them embracing these two, but going into many more details, were also presented. Addresses followed the introduction of the resolutions and the written report of those addresses and the discussion now forms a symposium on the present condition of the mining law that probably is unequaled. It was issued as one of our bulletins and was also issued as a special bulletin of the Bureau of Mines.

I recall the remarks of Mr. Kirby, representing the Mining Congress, who was the first speaker. He was dwelling upon the history of mining legislation and remarked that every century, of which we have any record with respect to what people were doing in the way of mining, shows that plenty of mining litigation has been going on ever since we had any history. He pointed out that always certain underlying facts were apparent.

First, mining is a very sensitive industry, easily destroyed but wonderfully responsive to just and wise legislation. Second, the laws best for the industry have been those evolved by the miners whenever they have been free to work out their own ideas. Third, ordinary land tenure kills the mining industry in most deposits and restricts it in all cases. Fourth, it is not to the interest of the community to have ore deposits held undiscovered or unworked. Fifth, the practical problem has always been the same; how to induce capital and labor to undertake the risks of mining; how to prevent the idle holding of deposits; how to prevent operators from tying up more ground than they need.

I recall also one interesting remark of Mr. Franklin K. Lane, who, as Secretary of the Interior, was addressing us. He closed his remarks with this:

The thing that has greatly concerned me has been the confusion in the mining law. I belong to the legal profession; you are expert engineers. A more dangerous combination cannot be produced. If there is any combination on earth that can develop confusion and make it worse confounded, it is just this particular combination. As the outgrowth of our joint enterprise, we have thrown into the law of this country a mass of intricacy which might have been avoided. The problem before us now is to get that crooked line made straight, and therefore, in advance of the publication of my report, I confide to you the fact that I have given my endorsement and made an appeal to Congress for the establishment of a commission to revise the mining laws.

Congressman Taylor, in speaking of the bill which he had introduced, said that he felt that there was ample reason for

introducing that bill in the last six lines of Mr. Kirby's report, and those six lines were read:

The present mining laws as a whole are hopelessly at variance with the geological realities of ore-deposit structures, and also with the practical operation of prospecting and mining. Moreover, their various parts are so interdependent that it is practically impossible to correct individual faults without revising them as a whole.

Speaking from the Western standpoint, he said that he felt that for the past two decades the development of the West had been so extensive in spite of the mining laws rather than because of them.

A number of our Congressmen said to us at that time words to this effect: You cannot get that commission idea through Congress; you must come down here with some definite propositions. Have your laws so worded that we can say YES or NO and we will get them through. If, however, you can come with a solid backing, if all mining engineers and operators will agree to these things, then we can put them through, but do not ask us to do it on the commission plan.

Mr. Winchell and the others who were there and who had had so much experience on this phase of the question, pointed out that this would be difficult, if not impossible; that no matter what proposition were presented, there would be opposition from some source, probably a small group, but with a very loud voice; and Congressmen would say, "See here, you are not in agreement on this; we can't put it through." They looked ahead, Mr. Winchell and his Committee; they realized that very few mining men really know anything about mining law, and they felt that unless the commission idea were put through, we would not get very far. They saw conditions as they exist today. They saw, for example, that the American Mining Congress, with a membership of several thousand, now agreeing, could not be depended upon to support the idea. Recently the American Mining Congress sent out a referendum to its members. It received some forty adverse replies, and it turned around from what its committees and what its members said a few years ago. The Northwest Mining Association which has approved nearly all of the Mining and Metallurgical Society's resolutions, now, not approving of the wording of the new law or of the personnel of the committee, suddenly decides that any change would be dangerous. Again we see from the letters of the prospectors that some of them sitting behind the stove in a country store and hearing that the assessment money may go

straight to the country and not through their hands see their easy money getting away from them, and they let their representatives at Washington know that if any law like that at present proposed goes through prospecting is going to stop.

When the committee on resolutions of the convention had considered all of the resolutions that came before it, it made a report and this is what was reported and was the action of that convention:

First, requests that the revision should be thorough.

Second, that revision should be made through the recommendation of a commission created by Act of Congress and appointed by the President, the commission to consist of one member of the bar, one representative of the Department of the Interior, and three mining men. Whether the commission is to receive any emolument or not, is unimportant.

These resolutions were agreed to by everybody—by all those organizations represented at the Washington convention. As I said before, Mr. Foster, the chairman of the House Committee at that time, was not in sympathy with this idea. We thought, however, that we could get it through, but we failed. There was no action taken, but our Committee did not cease its work. In the latter part of 1917 the chairman of the House Committee invited the Bureau of Mines to create a committee which should prepare a modification of existing law. Doctor Manning, then the Director, invited the co-operation of the Council of this Society and the Council named a committee with Mr. W. R. Ingalls as chairman, Mr. Walter Douglas as vice-chairman, the other members being Mr. Hennen Jennings, Mr. J. R. Finlay, Mr. J. Parke Channing and Dr. L. D. Ricketts. During the life of the committee Mr. Hennen Jennings died and Mr. Winchell took his place. The committee thus constituted owed responsibility to no one except the Federal Government. It represented no party except the Bureau of Mines, but it had at its disposal a vast amount of data and was undoubtedly better informed when it started to work than any commission after it traveled all over the United States and had gathered information direct from the field. For nearly two and a half years the committee worked, gathering data and conducting a wide correspondence.

If the critics of the committee had spent one one-hundredth of the time in studying the work of the committee they would have seen a tremendous amount of good in the Arentz bill, and if they had still spent a quarter as much time in advising of



something to take the place of what the committee has done or suggested, that would be keenly appreciated, but with all of the destructive criticisms that have been made, there have been very few constructive suggestions made. The committee presented its report and as a result of that report Congressman Arentz presented his bill last July. That reminds me of the way the Mining Congress speaks of Mr. Arentz in its report. The Mining Congress has been very active, but it changed its stand very much and it now rather suggests that Mr. Arentz is not entirely pushing this bill, but has got the bull by the tail and doesn't know how to let go. It is up to us to furnish Congressman Arentz with the rope to take that bull by the horns. I think we can do it and I think he can handle the bull too.

There has been a lot of criticism coming from the West. Sometime ago *Mining and Metallurgy* presented an article that criticized the position of the Northwest Mining Association which turned around so quickly. The A. I. M. E. has been supporting the bill, but now its members have a great deal to say in the way of criticism of it, so this article was written calling their attention to the situation. *Northwest Mining Truth* comes back with an article that stated very clearly the whole situation out in that country and what is troubling them. I think it is worth while repeating.

*Mining and Metallurgy*, the very admirable publication supported by the A. I. M. E., in discussing the "Revision of Mining Laws" in its January number, assumed the rôle of a fond mother garrulously insistent upon compelling others to see her brat as he appears in her own eyes. *We have always supposed that the proposed revision of mining laws was undertaken for the benefit of the prospector and the miner of the West.* If then, the proposed law, even though designed by men of commanding respectability in the engineering and mining world, does not meet with the approval of those for whose benefit it was intended, *why bother about it or about them?* Certainly we can see no reason for the wailing tone adopted by the New York publication.

Much space is devoted to the attitude of the Northwest Mining Association, of this city, which recently passed some strong resolutions on the subject, in direct contradiction to resolutions on the same subject, adopted at the convention six years ago. In this somersault of opinion, *Mining and Metallurgy* might read, if it would, the real reason for the refusal of the West to endorse the report of the eminent committee which has rendered such conspicuously valuable service. For six years the mining industry has been sandbagged, slugged, bedeviled and laid prostrate by the most exasperating succession of legislative deadfalls ever devised to take the joy out of life and render business unprofitable. No matter which way the miner has

turned, he has run into some new device of legislative torture until the very name of law is anathema.

What the West needs more than new laws, is less. Under the old laws, bad as they may be, we know approximately where we are at, and with the experience of recent years still freshly marked on our hides we prefer to meet evils of which we have knowledge than fly to remedies that may be worse afflictions in this disguise. We are sick to death of regulation; definitely and everlastingly against further injections of the virus of bureaucracy, and ask only to be given a rest, that we may quietly live down the unspeakable past and coax prosperity back in our own way. From its vantage point of superiority *Mining and Metallurgy* may pity us, but we are inclined to think we can stand even that if we but persuade our well-meaning but misguided friends to let us have peace.

"Why bother about it?" That is what the boy thinks when we want to give him a dose of castor oil. His mother must insist on it, and if he doesn't like it he is pretty apt to think, "Why bother about it, mother?"

There is one point, however, on which the Western editor is a little off and that is his idea that the law is solely for the benefit of Western prospector and Western miner. In respect to this Judge Lindley had something interesting to say at one of our meetings:

The original nucleus of the public domain was acquired by the Government as the unit of the Revolutionary War; the lands were ceded by the states in the first instance under a solemn contract that the government should act as trustee of the lands for *all* the people; not for the people of any locality or any state, or any part of any state. It was a trust charged upon the Government to deal with that property for all the people. I am quoting precisely the language of the Supreme Court of the United States in construing the attitude of the Government in dealing with these lands.

**S. S. Arentz.**—It is always a pleasure to meet with men who are sincere, and from the moment the report of the committee appointed by the Director of the Bureau of Mines was handed to me I have felt that the committee was sincere in drawing up its report. They have given the matter of the modification and the revision of laws a great deal of attention during the two years and a half they had it under consideration, and when it was presented to the U. S. Bureau of Mines it was felt by the members of the committee, I am sure, that it was something that should carry weight, a great deal of weight, and as far as I am concerned it did carry much weight.

When the matter was brought to the attention of the House

Committee on Mines and Mining, through Mr. Bain and Mr. Black, I considered that there might be another viewpoint; and only on that assumption did I undertake to give this bill the utmost publicity. This I did first by introducing it, for the reason that there is a double space between each line, permitting one to interlineate, to place upon this bill suggestions or criticisms; and in the letter that I sent out with copies of the bill I requested that constructive criticisms be offered. It is very true, as Mr. Sharpless says, that in most instances no constructive criticism was offered, but merely rank criticism; and a great many of the men who took this bill under consideration assumed that somebody was trying to put something over, which was not a fact.

I have been a member of the association of mining engineers now called the American Institute of Mining and Metallurgical Engineers for a number of years, and even before I became a member I was deeply interested in the revision and the codification of the mining laws of the United States. The first thing that struck me regarding codification was that something should be done regarding the holding of vast acreages for indefinite periods. A man may come into a district and locate as many claims as he wishes, and he generally holds them as long as he desires unless some one comes in with the operation of a prospect, and then he must either do his work or get out or decrease the number of his claims.

The next thing that struck me as being important was doing actual assessment work, because I feel deeply on this subject as a mine examiner. I think most men here will agree that no mining property has been brought to the attention of any of you unless first a prospector has done work upon it. There is only one property outside of this realm that has come to my attention, and that was in a little place out of Las Vegas on the divide between Eldorado Canyon and Las Vegas. A man looking over the territory thought it looked as though it might be similar to Goldfield. There hadn't been a pick stuck in the ground in that locality, yet the man that had charge of the work went on the ground and drilled it. That is the only instance that has come to my attention in 24 years where men have taken up ground upon which a prospector hasn't dug. Now, what did that indicate?

It indicated to me that the prospector is the man who has found and developed the claim up to the point where you and I look at it. Now, if that is true, it follows logically that development work has produced the condition which justifies the



engineer coming on the ground. If that is true, it seems to me that it is necessary to continue spending money on the ground or to change the law so that it might improve the present way of doing things.

There are really five definite sections in this bill: (1) the repeal of the extra-lateral right feature; (2) assessment work not required; (3) discovery not required; (4) location according to cardinal lines; (5) unlimited millsites. Now, I would like to hear you men discuss those five points. I have just touched upon the one. I am open-minded, but I do want to see justice for the man on the ground, the man that makes the discovery and brings the prospect up to the point where the engineer will look at it, because I know and each one of you knows that unless there is a showing to justify a trip, either by hearsay or by letter or by some engineer telling you that he has seen a showing that would justify an examination, you will never look at a piece of ground. And the question has reference, not only to a lode claim of high-grade gold or silver, but also to such territories as Miami, Ray, Nevada, and Utah Copper, which are all porphyries. First in each one of these districts named men have done work; men have sunk holes and they have found enough justification for an engineer to say, "Does this showing justify me in getting capital to come in here and sink a deeper shaft or put down drill holes?"

Now, just a word about one other feature that we received most criticism about, and that is location according to cardinal lines. A man that locates 160 acres for a homestead locates according to cardinal lines, but do we stop to think that the moment a man takes up 160 acres of ground he says, "That is worth \$20, \$40, or \$160 an acre"? Now, the man that locates a claim, or eight claims making 160 acres, doesn't know whether it is worth a pin, and in most cases it is not worth a pin. He does a little work and then folds up his tent like an Arab and steals away.

The homestead man must locate according to cardinal lines, but the territory in which a mine is located is in entirely different country; it is necessarily up in the mountains or down in the desert most of the time, and the prospector generally hasn't got any more than his beans and bacon and flour between himself and the Great Divide. I would like to hear from you gentlemen on that.

I want the mining laws revised so they will meet, as nearly as possible the best interests of everyone that is connected with

the mining industry. The engineer and the financier come together, and we know as well as anyone else—more than any one else—that unless the engineer and the financier come in and buy the property the prospector will have only a hole in the ground in many, many cases.

I cannot believe that this law is for the benefit of any particular class. I believe you are trying to make laws which will meet with the approval of everyone; that is what I want to do, and I have given this proposed codification and revision the utmost publicity. Since the 12th of July of last year I have been swamped with correspondence. I think before we get through we will evolve something that will meet with the approval of everyone, and that is what we want to do. When you think of the channels through which a bill must pass before it becomes a law, there is a long, rocky road ahead of every bill and there is a long and rocky road ahead of this bill, because many members of the House will receive letters of commendation or condemnation from their constituents. I have anticipated that by focusing their attention on this bill now.

About the change of attitude now; I have followed this thing pretty closely during the last twenty years, and I know that I have attended meetings where there would be, perhaps just a little coterie of men who would get together and when a resolution would come up, they would say, "This is just exactly what we want." But the measure we have under consideration this evening has been printed in all the newspapers and it has been given publicity; certainly there is none of us who wants a bill to pass unless it meets with the approval of most people interested. I would like to hear you gentlemen discuss it.

**H. Foster Bain.**—I think our experience with this bill illustrates that we may be good engineers and good in our intentions, and yet very poor campaigners. The bill has had an amount of work put on it which is very remarkable. It was a result of some seven or eight years study, yet when it came to putting it before the people it went out in such form and with such an inadequate preparation that it awakened a perfect storm of abuse from all over the West; if there is any corresponding sentiment on the other side it is not vocal.

I did not realize until I made a trip through the West last summer how generally this matter was being studied, how much thought was being given to it, and how much publicity this particular bill has had. When I was about half way through my trip they began to ask me about this proposed revision of

the mining law and I discussed it in half a dozen different states. Since then I have had a large and active correspondence on the subject. There was a feeling, as Mr. Arentz has said, that this was an attempt to put something over on the West. I believe that feeling has been dissipated. At the same time, there have been certain points brought out that perhaps none of us realized quite as keenly as we should. One of them is Mr. Arentz's suggestion that the prospector is a very important factor in the development of mines in this country and that this bill in its present form might in some way or other interfere with the prospector, would, perhaps, doom him to extinction. My own thought is that this fear is unwarranted and that the bill need not interfere with the prospector to anything like the extent that he thinks; but I may be wrong, and certainly this feeling of the prospector is so much a concern of all, and is so keen and general throughout the West, that we must consider carefully the possible effect on the prospector and his future.

There is another bill before the House that has gone to the Public Lands Committee, which carries a feature that has been mentioned tonight with the suggestion that the man who takes up a claim may at his option pay cash to the Government instead of doing assessment work on the ground. That has received the approval of the Secretary of the Interior and that approval, I may say, is based upon a considerable number of years' personal experience on the part of the Secretary as a prospector and as a man who received grubstakes for doing prospecting for other people; he is thoroughly convinced that it would be wise to open a way for the payment of cash in lieu of work. It comes up as a practical matter before the Department from time to time because under the law it is necessary to require work to be done on the ground. We know and everybody else knows that under the conditions it is simply a waste of effort and a foolish expenditure of money; that it isn't necessary, it doesn't develop, and it is of no benefit. I have in mind some shale claims in Colorado on which the only work that could be done would be to climb up the side of the cliff and put in a blast. It would not do a thing to promote the development of the property, and the man who has to do that would much prefer an opportunity to spend that money in getting a road into the district or in making a study of the methods of treatment of the oil shale. Now, there are thousands of cases of that kind and it seems to me that it would be feasible to work out a law which would meet that situation without unduly hampering the prospector in his work in the West.



I came back from the West with a feeling, which has been confirmed by what I have seen since, that the fight for the abolition of extra-lateral rights has been won and that a determined effort will enable Congress, with fair backing of public opinion, to make that change in the law. I think that is one of the things which we can feel pretty certain about if the campaign is properly managed and carried through.

There is to my way of thinking another very important situation which is not properly handled by the present law. The proposed law would have handled it, but evidently the particular method adopted therein does not meet with the approval of the West. For the large buried deposits, which do not outcrop, and which we all believe will be developed in the West, the present law is entirely inadequate. Any of you who have had the actual experience of getting together the large groups of claims which have been brought together to develop the porphyry coppers can go back over your minds and recall the subterfuges, the evasions, the devious interpretations of the law necessary to do what must be done wherever such properties are to be developed. I should like to have the way open so that a man can do a piece of necessary work like that without all the legal evasions which have been necessary in the past. This committee has set forth what is the ideal thing to do, and has devised what it feels to be the best possible mining law. It seems to me we should not feel its idea is hopeless. Apparently it will not be possible to get that mining law adopted in the present state of public opinion. Let us therefore see what is the next thing to do. So far as codification is concerned, if this codification does not go through, some other will, because the Public Lands Committee is engaged in a codification of laws relating to public lands, and eventually they will reach the codification of laws relative to lands containing minerals. It is therefore a question whether the mining law is to be codified later by a group of lawyers or whether it be done now with help and advice from the mining engineers. We can give that help in no better way than by changing a few of the features that we consider most important.

**B. Britton Gottsberger.**—Mr. Arentz in his remarks has summarized the main points in the proposed law very concisely under five headings on which he has asked us to comment. I should like to say a few words relative to them.

In connection with the advisability of requiring the actual doing of assessment work on the ground, Mr. Arentz holds to

the idea that the prospector, through his work on mining claims, brings them to the point where an engineer can form an intelligent opinion; and he cites as examples the porphyry copers. I incline more to the views expressed by Doctor Bain when he says that most of the assessment work done represents money thrown away. Referring to the Miami district, I think Mr. Channing will bear me out when I say that when he first visited the claims taken over by the Miami Copper Co., there probably was not one foot of work done on them by prospectors that helped him to form an opinion of the value of the property. He must have drawn his conclusions entirely from his observations of the surface conditions coupled with his experience of what he had seen of similar deposits elsewhere. I believe that feature of the law making assessment work optional is a very wise one and am glad to hear Doctor Bain say that it is received with sympathy in Washington by the present Secretary of the Interior.

As to discovery, on which point Mr. Arentz asks for information, I believe we have reached the point where we must frankly acknowledge that if the remaining mineral deposits of the West are to be opened up, people must be allowed to enter on them without having to make false claims of discovery at the time of making a location. The law provides for this and I think it is a distinct step forward.

As to extra-lateral rights, I imagine that nearly every one has reached the conclusion that they should be done away with. In the case of the various porphyry copper deposits, I believe the question has been universally settled by mutual agreement among the holders of property in the various camps.

As to millsites of unlimited area, I was not aware that this was provided for in the law. I think this is a point that has to be taken up with the Interior Department and the necessity for any area above the ten acres provided for in the law must be demonstrated before a larger area will be granted for this purpose.

As to the location of claims on cardinal lines, I doubt if we should insist upon this point. It seems to me, however, that when we ask for a square claim, we are on very safe ground. In a district such as Miami, where lodes do not exist and there is no reason and, in fact, no means of laying out a claim with a vein deposit, rectangular claims are already largely in use. In such a location it is very common to find a group of claims laid out in the shape of a large rectangle composed of smaller rec-

tangles 1500 by 600 ft. in size. Square claims are, to my mind, a decided improvement. I also like the provision in this law which provides that one discovery is sufficient to cover the patenting of four claims in a group, for the reason that the work necessary for patenting can therefore be concentrated at one point.

**J. E. Spurr.**—In general, I fully approve of this proposed law. In its most essential features it will not, I think, be disagreed with by anybody here, or upon full explanation by anybody else, whether prospector, engineer or capitalist; but it does appear that it has proved too big a dose at one time for some people, especially those who go out and prospect and dig a hole in the hope of getting an engineer on the ground and eventually a capitalist, and so turning the prospect into a mine. It seems that some parts of the law have aroused suspicion in this group. I think one of the things that has done that is what seems to them the difficulty in the way of their locating a claim at all; it looks to them as if it would be an impossible thing to go out and prospect, for if they find anything how are they going to locate? It looks to them, sitting back there and talking of the iniquities of the Government and the iniquities of capital as if "something is being put over on them."

Mr. Arentz says something ought to be done. We are all in favor of that. We all know the necessity of revising our present inadequate, old-fashioned, and, I might say, even asinine mining laws, laws that were put into effect before we knew anything about ore deposits. The outstanding thing on which everybody can agree East and West is the extra-lateral right. This isn't a practical thing; it hasn't worked out in a practical way; and that statement requires no demonstration to any of you gentlemen here or to any man who has ever had wide experience in mining. We are the only country as far as I know which has clung to a theory of the shape of ore deposits, which would justify as a practical thing the law of extra-lateral rights. That theory was brought into Congress and put into law by a Nevada man who was familiar with the Comstock. If we had never had any more mines than that we could have worked very well with the doctrine of extra-lateral rights, which embodies that inherent logical right of the owner to follow his vein as far as he can. The trouble is that he can't in nine cases out of ten; and if Senator Stewart had formulated the law subsequent to the discovery of Tonopah we would have had vertical lines. In many camps, by arrangement among the mine owners, they



have agreed upon vertical lines, pointing out the way for logical changing of the laws. If that logical change be made for future camps, of course we shall need the wider location. The elongated location is based on the theory of locating upon a lode on the dip; but if you aren't going to be able to follow this lode, you must have a wider location and the square location becomes desirable.

It seems to me that we can all get together upon the abolition of extra-lateral rights for claims located in the future. We must make it clear that it isn't retroactive and doesn't apply to claims located in the past. That is thoroughly covered in the bill which has been prepared, but it isn't thoroughly understood in the West. They believe that this will throw open and invalidate the rights which have been acquired in claims located in the past. In view of this, I doubt whether after all we may not have to come back to the piece-meal method and put these things over one by one; and only so rapidly as everybody sees the advantage of these things and wants them.

There is just one more point that I think perhaps is pertinent and that is the question of requiring discovery. We have for years located claims without discovery; we have sworn to a discovery, and yet we had no honest-to-goodness discovery; still those claims hold good and are legal claims. Take the case of Tonopah, for instance. Those claims are held and worked in the only possible way under the present circumstances. The location work and the annual assessment work that is done is in those cases labor thrown away. Where there is no discovery it would seem as if it would be better to acknowledge the fact and better, perhaps, for everybody, if under those circumstances, instead of digging a hole in the wash, the money could be turned into the Government treasury or in some other way made effective. In the future we shall have to take up more and more claims that are covered by overburden and sink shafts until we find whether there is ore-bearing material underneath. It seems to me there should be some way provided by which we can honestly take up such claims and work them.

**Allen H. Rogers.**—I think Mr. Arentz does us little more than justice in saying that we are very sincere on this subject. I do not know why it is that the people of the West always refer to us as Easterners. You cannot do much mining around New York. Most of us mining engineers who live here have passed a good part of our lives in the West anyway. I feel sure this bill in its present form is drawn for the good of the

industry in general. We haven't any particular personal interest in it. We believe that the mining industry generally would be better off with this bill. We have all of us had experience with the result of extra-lateral rights. We have all had experience of location only after discovery and all the other features. Mr. Sharpless has told us the history of the formation of this bill and we have learned that the Society has been intensely interested and active in the matter right through. The fact that adverse criticism is coming from the West seems to me to indicate the need for further discussion among the Westerners. I suppose it is entirely true that a great many prospectors regard engineers as their enemies, and I think perhaps there may be some warrant for that; not that the engineer is really an enemy, but he has to burst a great many bubbles that exist in the prospecting mind.

In view of the interest that the Society has always had in this subject and the active part that it has taken in it, it seems to me that the members of the Society ought to do everything they can to promote the ideas that are fundamental in this bill. I hope that when this bill comes before the Committee on Mines and Mining for a hearing we shall have a committee there to present the result of the referendum which the Society held seven years ago on the subject, which included all the principal features of this bill, that they might know that our action was favorable.

**Archibald Douglas.**—My primary purpose in coming here was to learn as much as I can of this important matter and to say as little as possible. I have read with great interest the bill under discussion. I have given it thought and have had some correspondence in reference to it with Western attorneys. All mining men and lawyers interested in mining will agree that if we can secure passage of only that portion of the bill doing away with the law of the apex the mining industry will be under great obligation to the proposers of this measure. It will mark a great advance. One attorney, a distinguished apex lawyer, suggested to me by way of jest that the old law had stood him very well.

The lawyer in the East is not so concerned with the question of conveyancing and the taking up of mining titles as the attorney actually on the ground. I gather that there is great opposition from the local prospector and from locators and from some attorneys in the field, as our Congressman has stated, to many of the provisions of the bill in reference to the location

of claims. There is always opposition to change. One suggestion that I had was that the square claim, while it might serve admirably in locating porphyry deposits, might not be advantageous in vein sections of the country. There is therefore undoubtedly a lack of understanding of the effect of the bill.

I hope that this committee will continue and submit this bill to Congress and keep its strong and representative force behind it.

**S. S. Arentz.**—A number of thoughts that had escaped my attention were brought to mind by the talks we have had here. I think Doctor Bain is right when he speaks of the utter ridiculousness of doing assessment work on such claims as those covering oil shale. I think those things were in the minds of the committee when the bill was drawn. It seems ridiculous to do assessment work on such claims as come under the Stone Act—phosphate rock, limestone, borax, oil shale, and a number of other earthy minerals. If we incorporated into the law provisions covering such claims; for example, that work could be done in one place covering a big area of the claims, it could meet with no opposition whatever. Another idea comes to me, something to which I have given considerable thought, and that is that a great number of big mines are going to be discovered in areas which on the surface show nothing more than decomposed quartz and limonite stone. The possibilities below certain areas that I know of in the West may be tremendous. At the present time we have taken up those areas of porphyry which show a small amount of copper on the surface in some places, other places that on the surface show no copper stain and no indication of mineral except replacement; in other words, a decomposition of the sulphide in the quartz of shell, where there is an area of mineralized territory underneath this area which on the surface shows nothing but decomposed quartz.

Why not get together and cover that sort of deposit, so that if a man will pursue a prospect diligently with a drill over a certain period of time and make a discovery, a large acreage of ground sufficient for some useful work would be held and patented? That is what I think was aimed at when this bill was drawn. I can see that as an absolute necessity if we are going to prospect territory that has only the slightest indication of mineral, or no indication of mineral whatsoever, but



latent possibilities, and, as I say, merely shows decomposed rock.

I should like to see the committee get together, and I would insist that if the majority of people do not show dissatisfaction with certain provisions of the bill we have no right to assume that it wouldn't meet with approval of the majority. For that reason I would like to see these things put in the bill. Let us make the bill in toto something that can be passed that way, but exclude the features of the bill which the man on the ground doesn't want.

**W. R. Ingalls.**—I did not intend to say anything tonight. The committee has done its work and I have thought, and the other members of the committee have concurred with this opinion, that we should have nothing further to say on the subject until we were asked to say something. It is certainly far from our minds to appear as advocates of the bill that we have drawn. Our position is that of counsel. We have given the advice that we considered best. We have at no time been under the impression that our work was perfect. We appreciate human fallability. We do not think anybody will be perfect until the millenium. We welcome constructive criticism and suggestion and it may be that after all we shall be asked collectively to express our opinion of it and co-ordinate it, because our work from the beginning was one of co-ordination and reconciliation of many different wishes and many different ideas.

There was one thing which in Mr. Sharpless' very excellent historical summary he overlooked mentioning, namely, that after the convention in Washington the Mining and Metallurgical Society, addressed to its membership a specific questionnaire of some fifty questions as to how the mining laws should be revised. At the same time the questionnaire was submitted to the Idaho Mining Association, the Nevada Mine Operators Association and all of the other Western mining bodies which participated in the Washington convention. A number of those organizations submitted the questionnaire to their memberships, and the result of the vote in them was substantially the same as the vote in the Mining and Metallurgical Society. The committee had all of that, together with all of the work that had been previously brought out by the Winchell committee, before it entered upon its work at all.

Now, naturally, there were differences of opinion as to how

things should be framed, emanating from those who were engaged in different kinds of mining and also from different parts of the country. There were certain fundamentals upon which everyone agreed. One was the abolition of the law of the apex, another was the abolition of discovery as a pre-requisite to location. There was a third one which has not been mentioned this evening, upon which everybody agreed, and that was that there should be the minimum of change from the existing laws, the idea being, and I believe it was a sound idea, that the maximum of benefit should be had of the wealth of legal decision that had been given by the courts in the interpretation of the existing laws. For that reason the committee did not undertake to construct an ideal law. If it had been attempting to construct an ideal law, it would have done something different from what it did. What it did undertake was to codify the existing laws and make the fundamental changes that the mining industry in these numerous ways had shown that it wanted. So much for that part.

There came then the matter of reconciliation of conflicting opinions as to details. Everybody wanted a square claim; no other suggestion was offered by anyone. However, the people of the Northwest, being in immediate contact with British Columbia, where they have large square claims and knowing how well they worked, wanted large square claims. On the other hand, the people of the Southwest, being in close contact with Mexico, and knowing how well these small square claims of Mexico worked, wanted small square claims. The committee had long debates over that question, as it did over many other questions, but as I say, although many differences of opinion arose in the committee during its deliberations, every single action that was taken by the committee and drafted in the bill was unanimous. There might be some details in the bill that everybody did not like equally well, but before we got through things were fixed up so that everybody could agree unanimously upon them, and so it was with the matter of size of claims. We eventually defined a claim so as to please everybody insofar as the square claim was concerned. Those who wanted the large square claim have it; those who wanted the small square claim have it at the same time.

I am saying all this at this length to lead up to an explanation of some misapprehensions that have been exhibited in the

talk this evening. The bill as it was drafted and as it is now before Congress does not in any way change the right or ability of the prospector to do his assessment work as he does it now if he wants to. He can do that. If, however, a person who has located a claim sees that the assessment work will be a waste of money, or if for any other reason he does not desire to do it, he has the option to pay the equivalent in money to the Government not for expenditure in the Government's work, but for expenditure for the benefit of the district from which it was paid. That, however, is merely an option. In the case of ore deposits hidden below the surface for which exploration is projected, as Congressman Arentz has just indicated, that also is specifically contemplated and provided for in the bill.

Mr. Douglas has suggested an objection on the part of some of his legal friends in the West about the inability to locate claims in a certain way and the objection raised to the square claim. That is no valid objection, for the person who wants to do what Mr. Douglas indicated, simply has to locate a row of claims and he gets the same thing.

There were also other things that came before the committee in its deliberations. It was found, for example, that in the act of codification, in putting things together, certain provisions of the existing laws did not jibe with other provisions which also were in it. It was found that in certain cases the existing laws, which at present are scattered through the statutes, were in conflict with themselves. Those things also had to be cured.

Finally, there was the very important situation that had not been previously considered by anybody during the long course of previous deliberations and debates by the Society on the subject; namely, what was going to be done in the case of the big mining enterprises that we could foresee in the future; the cases where very prolonged exploration work may be necessary through the sinking of very deep and very expensive shafts; conditions that could be met only by concerns that were prepared to spend a great deal of money in such exploration? What, moreover, should be done by persons aiming to make a large development like those of the porphyry deposits? What is going to be done with the overburden that they are going to strip off to get at the ore and for the storage of which large areas are required? And after they get the ore and get to milling what is to be done with the immense accumulation of



tailings? Those questions had not been touched upon in the previous discussions, yet they were of very vital importance, and they necessarily came in to the design of a bill having in view the general good of the mining industry and having in view the nature of what we can all foresee mining in the future is likely to be.

**J. Parke Channing.**—I cannot agree with Mr. Spurr that it would be advantageous to modify the present jumble of mining laws piece-meal. Within the last two or three years I was instrumental in the movement for the creation of a National Public Works Department in Washington. The results of that campaign were so successful, it set so many people thinking, that we builded very much better than we knew, and the result is a movement in Washington for the reorganization of all the executive departments. Whether that will be carried further I do not know, but I think there is a feeling that the executive departments in Washington have grown up piece-meal and the result is chaos. Certainly our mining laws have grown up piece-meal and Mr. Ingalls has shown you that they are chaos. Therefore, I think this proposed law, which really is a modification of the old laws with the minimum amount of change and with the addition of these things that seem to be admirable, should be put through as a whole.

The five points which Congressman Arentz brought up have been all more or less discussed, but I shall take them up in the order in which he gave them. First, as to extra-lateral rights, I think everybody admits that extra-lateral rights should be abolished. I know in my own past experience, if I looked at a property I wasn't satisfied to take it over if the outcrop had been covered, and I was not inclined to consider it unless there were sufficient claims on the hanging-wall side so that I could feel that its future was sure to a reasonable depth.

In regard to the assessment work, Mr. Ingalls clearly brought out that there is nothing in this proposed law that will in any way prevent the prospector or anybody else from following the old way if he wants. There is only a privilege given in case the owner doesn't wish to do the assessment that he may make a payment in lieu thereof.

As regards discovery, I believe that the development of the mineral wealth of this country is retarded and will be retarded unless the privilege is granted of making a location with-

out discovery, and, if I may somewhat amplify what Mr. Gottsberger has said, I can say quite frankly that when I looked at the property which is now the Miami Copper Co. there were on it possibly forty or fifty pits ten feet deep, not one of which had shown any ore and not one of which had the slightest effect on me in determining the value of that property. I knew if there was any ore in the Miami mine it would be down at least a hundred feet. It turned out that I had to go down 220 ft., so that with due respect to the old-time prospector, I believe that very largely in the future the properties that will be developed will be those properties which do not show ore upon the surface. As an additional example of this we have the United Verde Extension.

As to the laying out of the claims on cardinal lines. The way that developed was this: it was explained to you that the people in the North wanted the large claims and the people in the South wanted small claims, so we finally decided on a claim of 1320 ft. by 1320 ft., and a smaller claim of 660 ft. by 660 ft.

We felt that a great many of these claims would be located on land that was already sub-divided, and therefore the logical thing was to make those claims conform to the sub-divisions of the public survey. Now, assuming that our deduction was right then the necessary corollary was that if claims were to be located in unsurveyed territory, it would be desirable to have them conform as far as possible to the public survey; therefore, they were laid out on cardinal lines. I am willing to admit that possibly our deduction on that point was wrong, and undoubtedly if the consensus of opinion among mining men is that claims should be laid in any direction, northeast, southwest, I would be perfectly willing to change my decision on that matter if it should be referred again to the committee. The only difficulty would be if claims like this were laid out upon public surveys they would cut diagonally across the surveys.

In regard to the fifth point, the necessity of getting dump room for waste and storage room for tailings, I think this is a very important point and if you had gone through some of the difficulties that I have in getting land for these purposes and getting it honestly, you would see what one is up against. As Mr. Ingalls has very properly pointed out, we are going to mine in the future more and more ore of low grade and there must be some legal manner in which the reject can be disposed of.

If you will read the law properly you will see that no mineral rights go with the ground and if anybody wished to make a location on that ground for the purpose of mining he has a perfect right to do it.

I repeat my firm belief that, with the possible exception of laying out claims on cardinal lines, I see nothing in the law which doesn't agree with the express desire of the majority, and a large majority, of the men in the United States, both prospectors, engineers, and financial men who are interested in mining.

**W. R. Ingalls.**—May I say one word as to the last point Mr. Channing has spoken of. I am inclined to think that the committee considers the matter of locations conforming to public land surveys is one of the immaterial features. The position of the committee in this respect is rather like that of your doctor to whom you go for advice and he tells you for the general benefit of your health to quit smoking; but you plead with him for the right to continue and ask if it will do you great damage to do so; and the doctor may say it won't kill you, but you would do better to follow his advice.

I desire to clear up one other point of uncertainty; namely, as to the taking away of any existing rights. The bill does no such thing. Insofar as existing extra-lateral rights are concerned, the bill is as emphatic as language can be in insuring to every possessor of any valid claim at the present time, or any invalid claim either, the right to everything that he might have under the existing law. That cannot be taken away from him. The bill does not try to do it; but the bill does something more; it gives to every owner of a claim something that today he hasn't got; namely, whereas at the present time he has the right extra-laterally to follow any veins that pass outside of his side lines, this bill confers upon him the vertical rights to any mineral that may be found in his claim that does not belong to anybody else.

**S. S. Arentz.**—I would just like to say a word about having things in a bill that may destroy it. It is of the utmost importance to present in any bill features that cannot be misunderstood. If there are features in this bill that can be misunderstood, and we want the bill passed, let us eliminate those features and make them plain so that he who runs may read.



I might just mention in this regard the feature of the bill regarding patenting. It will take an attorney, and a good attorney, to tell the ordinary prospector just what he has to do in that regard. The man will say, "Well, a man can hold twelve years without discovery; he can hold a claim twelve years." And the ordinary man that has to do with mining property will say, "Oh, we don't want that." Well, now, if features like that could be eliminated and cleared up one by one, as I feel sure they can be, then we will have something that can be handled before the House. It is important in legislation in every case to clear up ambiguities and make it perfectly clear. We all understand the present mining law and we don't have to be lawyers to understand it. I am speaking of one grave objection that I have heard to that particular feature of the bill having to do with patenting claims.

**W. R. Ingalls.**—How do you get the idea that a claim may be patented?

**S. S. Arentz.**—I am just telling you what people have written me, and what men who should know have said regarding it; and so if there is any ambiguity let us clear it up.

**J. Parke Channing.**—Do you see any ambiguity?

**S. S. Arentz.**—I am speaking of this phase and I will say there is some ambiguity. You men have both said that man isn't perfect and there isn't any bill that can be drawn up by any set of men, the best men in the world and the best legal talent, that will not need going over; and that is what we are trying to do, to perfect it. I am not belittling it, I have the highest regard for the men on this committee.

**The Chairman.**—As I read this bill I understand that a man can hold his claim for twelve years without patenting, but I don't understand how that affects patenting when he is ready to go to patent.

**W. R. Ingalls.**—Most certainly if there are any ambiguities we want to clear them up, but of course nobody can cure ambiguities that result from failure to read. There are a great many things that appear ambiguous which I am sure result from failure to read the text.

**H. Foster Bain.**—On that point, I do not know whether the

committee intended those claims should be held ten years or twelve years and I have studied that.

**The Chairman.**—As I have read it, it is intended a man may hold it five years without discovery and then he may go to patent if he wishes, and apparently he is allowed two years within which he must patent, but if he wishes he may by paying hold it a further five years and at the end of ten years he still has his two years to patent. Am I right, Mr. Ingalls?

**W. R. Ingalls.**—No. He can hold a claim for five years without discovery; then under certain conditions he can hold a claim for another five years without discovery, but for the additional term of five years the terms are made very severe. The idea of that was to meet the conditions that might arise in the exploration of a very deep deposit for which anybody would have to sink a deep shaft in which he might meet with very considerable difficulties that would prevent him from reaching an orebody if there were such in a period of five years.

Now, the conditions of patenting are quite different. Before he can obtain a patent a discovery must be made and then after making a discovery he must apply for a patent within a period of seven years.

**Robert Peele.**—I came here tonight, as some others apparently have, with the idea only of listening, but I cannot help thinking of a statement made by Judge Lindley in one of his three big volumes on Mining Law, in which he characterizes the law of Mexico as being "the best example of a liberal and progressive system of mining laws of any which has heretofore been enacted in any country." These are Lindley's words, and I wondered while sitting here whether the Committee has studied carefully the provisions of that law, with the idea of getting suggestions and perhaps avoiding some of the difficulties that were found and remedied by the successive modifications of the Mexican law, which was of course originally based upon the old Spanish code. The recent changes have related chiefly to matters of mining taxes and duties; not to the fundamental provisions of the law.

Another point to which my attention was drawn was a statement made by Mr. Spurr, to the effect (if I understood him correctly), that our country is the only one in which extra-lateral rights have ever been recognized. There was a law of

extra-lateral rights in Germany in the sixteenth century. I suppose it lapsed long ago, because it applied only to metalliferous deposits, and metal mining is comparatively unimportant in that country. There was also a law of extra-lateral rights in the lead district of Derbyshire, England, in the seventeenth century. In very recent times it was tried again, in British Columbia, but was abrogated about 1896 because it did not work satisfactorily. There can be no doubt as to the wisdom of excluding that provision from the proposed revision of our own law, and the change will probably be gladly accepted by most mining engineers and mine owners.

**The Chairman.**—I am familiar with the Mexican law and with the law in other Spanish-American countries. I know that they haven't extra-lateral rights, that they do have square claims which do not follow the cardinal lines, and certainly in these essential points this proposed provision conforms to the Mexican law.

**J. Parke Channing.**—One thing in the Mexican law that we couldn't countenance was that the description and not the monuments covered the location.



# Mining and Metallurgical Society *of America*



**BULLETIN**  
**Number 156**

**October, 1922**  
**Vol. XV, No. 4**

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**115 Broadway, New York**

## OFFICERS FOR 1922.

*President*, ALLEN H. ROGERS, 201 Devonshire Street, Boston, Mass.  
*Vice-President*, W. Y. WESTERVELT, 522 Fifth Avenue, New York City.  
*Secretary-Treasurer*, DONALD M. LIDDELL, 115 Broadway, N. Y. City.  
*Executive Committee*, ALLEN H. ROGERS, W. Y. WESTERVELT, DONALD M. LIDDELL, W. R. INGALLS and J. E. SPURR.

### COUNCIL

At large, ex-officio.

Allen H. Rogers, New York.....Retires January, 1923  
W. Y. Westervelt, New York.....Retires January, 1923  
Donald M. Liddell, New York.....Retires January, 1923  
Waldemar Lindgren, Cambridge.....Retires January, 1923  
\* J. E. Spurr, New York.....Retires January, 1924

Districts 1-2-3-4-5—Eastern Canada, New England, New York and New Jersey.

H. H. Knox, New York.....Retires January, 1923  
J. Parke Channing, New York.....Retires January, 1924  
Pope Yeatman, New York.....Retires January, 1924  
W. R. Ingalls, New York.....Retires January, 1925

District 6—Pennsylvania, Ohio, West Virginia, Maryland, Virginia, North Carolina, District of Columbia, and New Jersey.

George Otis Smith, Washington, D. C. ....Retires January, 1923  
R. A. F. Penrose, Jr., Philadelphia.....Retires January, 1925

District 7—Minnesota, Wisconsin, Michigan, Iowa, Missouri, Arkansas, and Kansas.

H. V. Winchell, Minneapolis .....Retires January, 1923

District 8—Colorado, Utah, and South Dakota.

Richard A. Parker, Denver.....Retires January, 1924

Districts 9-10—Northern California, Nevada, and Alaska.

Albert Burch, San Francisco.....Retires January, 1923  
W. J. Loring, San Francisco.....Retires January, 1924

District 11—Southern California, Arizona, and Texas.

S. W. Mudd, Los Angeles.....Retires January, 1925

District 12—Washington, Idaho, Oregon, Montana, and Western Canada.

Reno H. Sales, Butte .....Retires January, 1925

### OFFICERS OF SECTIONS

#### SAN FRANCISCO

Frank H. Probert, *Chairman*.  
Edwin Letts Oliver, *Sec.-Treas.*

#### NEW YORK

C. M. Weld, *Chairman*.  
H. G. Moulton, *Vice-Chairman*.  
Louis D. Huntoon, *Sec.-Treas.*

DOUGLAS, ARMITAGE & McCANN, New York City, Counsel for the Society.

Printed in U. S. A.

# Mining and Metallurgical Society of America

Vol. XV, No. 4

October, 1922

Bull. 156

## ANNOUNCEMENTS

**New York Section.**—The proceedings of the meeting of the New York Section, held on May 16, 1922, are printed in this issue.

A meeting was also held on Sept. 27 at which Mr. F. A. Eustis gave a talk on the Production of Electrolytic Iron using Pyrite as the Raw Material. This paper will be reported in the November bulletin.

At the business session of this meeting Mr. C. M. Weld was elected Chairman for the ensuing year, Mr. Herbert G. Moulton, Vice-Chairman, and Mr. Louis D. Huntoon, Secretary-Treasurer. The Treasurer submitted the following Financial Statement:

### Financial Statement—Year Ended September 30, 1922

|  |          |
|--|----------|
| Sept. 30—Balance carried forward.....        | \$ 78.92 |
| Voluntary contributions from 85 contributors | 206.50   |
| Total .....                                  | \$285.42 |

#### Expenses

|   |          |         |
|---|----------|---------|
| Cost of dinners.....                          | \$634.30 |         |
| Receipts from dinners.....                    | 592.50   | \$41.80 |
| Printing and postage (notices)                |          | 97.40   |
| Reporting meetings .....                      | 122.00   |         |
| Received two-third cost from<br>Society ..... | 81.34    | 40.66   |
| Telegrams and incidental ex-<br>penses .....  |          | 15.93   |
| Leaving a Balance as of Sept. 30, 1922        |          | \$89.63 |



**Council.**—At the meeting of the Executive Committee of the Council, held on August 3, the resignation of Mr. B. Britton Gottsberger as Secretary of the Society was accepted with regret and Mr. Donald M. Liddell elected as his successor.

At the Council meeting on Sept. 27, in order to make the representation on the Council approach nearly a representation based on membership in the various districts, it was decided to re-district the territory occupied by the membership as follows. Eastern Canada, New England, New York and New Jersey shall hereafter constitute 1-2-3-4-5. Pennsylvania, Ohio, West Virginia, Maryland, Virginia, North Carolina, and the District of Columbia shall be known as District 6. The remaining districts remain unchanged.

Nominating ballots have been mailed to the membership.

**Referendum—Foreign and Domestic Mining Policy.**—The referendum on the Statement of Principles on Foreign and Domestic Mining Policy has been approved by the membership, 162 approving unreservedly, 10 approving with qualifications, 2 voting "no".

The Statement of Principles will be printed in the year book.

The Sub-committees to carry out the recommendations on the policy are as follows:

**Chrome:**

Albert Burch, Chairman  
E. F. Burchard  
Frank Probert

**Manganese:**

C. M. Weld, Chairman  
D. F. Hewett  
John A. Mathews  
Bradley Stoughton

**Petroleum:**

A. C. Veatch, Chairman  
Van H. Manning  
Chester W. Washburne  
David White  
A. W. Ambrose

**Vanadium:**

W. Spencer Hutchinson,  
Chairman  
F. L. Hess  
Harold Boericke

**Graphite:**

Benj. L. Miller, Chairman  
Edson S. Bastin  
Henry A. Wentworth

**Mercury:**

Geo. J. Young, Chairman  
Murray Innes  
F. L. Ransome

**Platinum Metals:**

A. F. Keene, Chairman  
J. A. Schloss  
J. M. Hill

**Tin:**

O. B. Perry, Chairman  
A. R. Ledoux  
H. H. Alexander

**Tungsten:**

Fred W. Bradley, Chairman  
A. G. McKenna  
O. H. Hershey

**Medal for 1922.**—It was decided to award the medal for the year 1922 for Distinguished Service in Contributions to the Literature of Mining Engineering, the word literature to be construed as including the compilation of hand books and writing of text books, as well as original contributions. Ballots for nominations have been sent to the membership.

## NEW YORK SECTION

### Meeting of May 16, 1922.

A meeting of the New York Section was held at the Harvard Club on Tuesday evening, May 16, attended by thirty-five members and guests. Mr. S. H. Ball, acting as Chairman of the evening, opened the meeting. Mr. W. R. Ingalls discussed some Economic Facts and Opinions, followed by Mr. Sam Lewisohn on certain conditions regarding the labor question.

**Mr. Ball.**—Members of the Mining and Metallurgical Society: I know you will all join in regretting that our Chairman, Mr. Weld, is not with us this evening, but he is on a professional engagement and I think if a mining engineer is on a professional engagement at the present time he is to be congratulated. An American colonel now residing in London recently stated in an afternoon speech that a woman's skirt should be long enough to cover the subject and short enough to be interesting. My own speech is going to be still shorter than that would indicate. It is unnecessary to introduce our Past President, Mr. Ingalls, to the members of the Mining and Metallurgical Society. After he has given us a talk the subject will be open for discussion both by our guests and our members. Mr. Ingalls will now favor us with a talk on some of the economic questions of the day. (Applause.)

**Mr. Ingalls.**—Mr. Chairman and Members: I feel that everybody ought to be pretty weary of hearing me about certain subjects. The only possible reason to the contrary is that the subjects that are engaging our attention at the present time are so vital. Mr. Ball has stated that after I have spoken the subjects I may touch upon will be open for discussion. This may open a very wide range for at this moment I do not know what the subjects are going to be. I am going to proceed more or less at random and speak of things as they occur to me.

I shall begin by dwelling a little along the new line of thought and research, the new viewpoint in which economic

questions are coming to be studied. This may be briefly characterized as the quantitative viewpoint. It is not an entirely new viewpoint or a new field of research but recent conditions have made it possible as never before. I will quote a moment from an article on this subject that I wrote recently which I am sure none of you have seen, which will give perhaps in the fewest words what we may describe as quantitative economics. It means the economic investigation of the things that can be measured arithmetically, statistically, and otherwise, the attempt to make such measurements and the determination of laws from the facts that are determined as existing. There are some economists who would banish the old scholastic definitions and start anew with the thought that unless we can have quantitative definitions it is better to have nothing at all. That is summarized in a recent expression by Cassell, the Swedish economist, who is one of the outstanding figures of Europe at the present time, who would sweep away all of the old clutter and begin all over again from the standpoint of fact. This is no doubt too iconoclastic, though there is merit in the idea. There is probably a great deal in old theory that has been founded merely on conjecture that will prove to be not supported by facts when the facts have been determined. But we must first of all get the facts and that is what is now important.

Abroad Bowley, Keynes, Cassell and others have all done noble work in this direction. In America King, Friday, Anderson, and a few others have worked on, bold and stimulating pioneers. The moulding of thought on the new lines may be attributed largely to the war, for although it produced a good deal of emotional economics and pure nonsense, it opened the eyes of a great many men not only to the need of scientific investigation but also to the proper ways to enter upon it.

This approach to economics is one that appeals especially to the engineer, for it is the very essence of engineering, first to determine facts and then to draw conclusions from those facts and finally, if possible, to establish laws. As I previously indicated, the great trouble with the student of economics in the past has been the absence of the facts, the inability to get them. More than that it is necessary that what are assumed to be the facts shall be established beyond question, that they shall be established in such a way that everyone agrees about them. We have often things that are really facts but of which the source is unknown, or as to which there may be doubt. For example, one of the basic factors that is involved in any consideration of the economic position of a country is the amount of its annual gross



income. For a good many years Doctor B. M. Anderson, who is now the economist of the Chase National Bank, had been computing annually and publishing in "The Annalist" an estimate of the gross income of the United States. Probably not very many people paid much attention to it. Those who did were no doubt of the opinion that it might be merely a clever guess and might be nearly right or might be quite wrong. It subsequently proved from studies of another body, about which I will tell you, that Anderson's estimates of the national income of the United States up to 1916 were pretty good; were in fact very close. After 1916 the general chaotic conditions prevailing in all world affairs destroyed the validity of the index factor that he had been using and after that his estimates began to go quite wrong. But, in fact, we did really have through his work valuable data, without knowing how valuable it was.

A few years ago there was organized in New York a unique body under the name of the National Bureau of Economic Research, whose purpose was to be the study of conditions and the determination of basic facts in such a way that they might be agreed upon as facts. This body was constituted with a board of nineteen directors, under whose control the research staff operates and conducts its studies. This board of directors was constituted to a large extent by nomination on the part of national bodies with a view to representing all colors of economic, social, and one might say even political law. The conception was that a group of reasonable men whose opinions and predilections might be as far apart as the North Pole and the South Pole might nevertheless be able to agree that certain things were facts and put them out of discussion.

This board of directors comprised such differences of opinion as may be exemplified by Mr. Roberts, who was appointed by the American Bankers' Association, and Mr. Frayne, who represents the American Federation of Labor and goes also into the Socialistic ranks. Not long ago at a meeting of the board the question of broadening its scope came up. It was suggested by somebody that it would be desirable to have an even more Socialistic viewpoint. Our Socialist member spoke up and asked if he were not adequately representing the Socialistic party. Somebody retorted, "Oh, yes, but you're only pink. We ought to have a real Red." (Laughter.) So this board of directors represents all colors and shades of economic and social thought from the pale pink to the ultra violet. (Laughter.) One of the secretaries of this organization only yesterday showed me some responses to letters that he has been issuing for a purpose and among them

was the reply from the president of an automobile manufacturing company somewhere in the West, which was very brief and very much to the point. It was this: "You certainly have got all kinds of thought on your board of directors. I don't see how you agree on anything." (Laughter.) Well, in fact, the first study of this organization pertained to the national income and the technical results of that amply proved the validity of the conception that there could be an agreement of reasonable men as to what are facts. The report on the subject that the Bureau has issued, giving the amount of the national income over a series of years, and giving the essential division thereof between labor and the class that may be grouped as property and management, has gone out with the assent and approval of the Socialist and labor members of the Board as well as those who exemplify different opinions. Certainly such a thing is a very great step in advance. It gives us something on which to draw, on which to base calculations. With such basic knowledge, economists and statisticians can more intelligently approach the investigation of such questions as the business cycle, which is among those that are particularly engaging attention at the present time.

We in this country in common with the rest of the world are now passing through the stages of readjustment that inevitably followed the greatest cataclysm in industry, in social affairs and in everything that the world has ever known. We in common with everyone else, abroad as well as here, are vitally interested in how long this readjustment is going to last. A good many people in their interest, in their hopes, in their wishes that may be father to their thoughts, are talking a great deal about business cycles, as though we had just passed from the crest of one through the trough of depression and were starting upgrade again toward a new crest. Some of these people go so far as to conceive that business cycles recur with a certain rhythm every so many years. Some say thirteen years, others say eleven years, and others have their own ideas, but in all cases the conception is of regularity.

This is no new idea. Only last evening I happened to pick up a French work on economics of about fifteen years ago and instantly my eye fell upon a chart of business cycles that this French author had plotted from almost the beginning of the last century and had shown peaks and depressions with almost the regularity of a picket fence. I don't think that there is anything in that idea. I cannot see why there should be. That business pursues its course of ups and downs in undulations is obvious. Everybody knows that. But because it has gone up and come

down why should it immediately go up again? It does not stand to reason that it should. Even within the last few years that are very fresh in our memories we see that things did not happen so. Immediately following the armistice we had rather a sharp depression in business in this country which ran for some months, following which business rose to a high peak which culminated sometime in 1920, from which it descended to a great depression and from which depression, since the beginning of this year we have had a little start upward. But no matter how much we should like to have this upward course continue to a new high peak we have no reason that I can see to be sure that it is going to do so, no reason to think that after a little further rise the trend may not be reversed with everything going down again.

In this connection, it is unfortunate that we do not possess any real good indexes of business to show how things are going, to show where we are at any given time, or anyhow with no more delay than a month or two. There are many efforts to arrive at such ideas by studies of data that are conceived to reflect basic factors, such as bank clearings, car loadings, the production of pig iron and other things of similar nature. There are attempts to consolidate such data into composite graphs. I am not at all sure that any of such lines really correlate with the actual changes of business or afford us really reliable indices. I think that if we were able to procure reliable data as to the percentage of employment in a country we should have the best possible index. The question of physical production connects itself more closely with the work that is done by men in employment than any other factor that I can think of. Such a picture needs, of course, to be modified by some factor representing efficiency. Some studies as have been made by statisticians in this country indicate to me that physical production in the past has in fact more closely coincided with this condition than with any other. Unfortunately, we do not possess any good data bearing upon this subject for the United States. That is a matter into which a great deal of research is now being made by various bodies under the inspiration of Mr. Hoover. In several of the countries of Europe there are regularly compiled fairly accurate data of that kind, especially in Great Britain and in Germany, and examination of such data for those countries seems to agree with and reflect and show the actual situation existing in those countries.

In Great Britain the rate of employment kept fairly high during 1919 and to about the middle of 1920, when the line took a plunge downward and, after attaining a low point in 1921, rose



a little and then fell back and since the beginning of this year has been ascending just a little bit, which showing is in close agreement with the situation of foreign trade, pig-iron production, coal production and other physical data of Great Britain that are available. Germany has since the end of the war shown the highest rate of employment among any of the countries of Europe. Its line has indeed been very high, running pretty regularly only a little short of one hundred per cent. However, all data reflecting physical volume of production in Germany has shown a greatly subnormal rate, indicating that although the German people have been quite fully employed their efficiency has been greatly reduced. The causes for such reduction in efficiency are various, but among them is considered to be the effects of the eight-hour day, which immediately after the armistice was established by decree. It has not been put fully into effect but it has been so to a very great extent and indeed the pressure of the labor unions in many of the factories and many of the mines the working time has been reduced, not only to the forty-eight hours permitted by the original decree, but to as low as forty-two hours. The labor unions of Germany are now endeavoring to secure the enactment of that decree as a law. The employers of the men are opposing the effort very vigorously, asserting that it is impossible to maintain the production of Germany at the necessary rate with the shorter hours of labor, statistics showing the physical volume of business in Germany support that contention. The fact is absolutely that at the present time in spite of high employment in Germany the industrial activity, the industrial productiveness of that country, is subnormal as compared with the figures immediately preceding the war.

In France there has been a similar experience, with the difference that in France the eight-hour day, which was instituted in the first place by the labor division of the League of Nations, or I should say the idea of it was so instituted, was actually made a law. The results have been so very serious in reducing the productivity of that country that strenuous efforts are now being made to secure the repeal of that law. The contention that the shorter working hours would keep the workmen so refreshed or prevent him from being so tired that he would do more in eight hours than he used to do in ten has proved absolutely a fallacy in both Germany and France and these are the only important countries of the world where there has ever been any real test of the effects of the eight-hour day en masse. In France it has been found that the ambitious workman, anxious to improve his position, would himself not be content with an eight-hour day

but after working eight hours in one employment he will go somewhere else and work four hours more in another job, while the unambitious, simply loafing, get so tired in loafing that they do not do so much in eight hours as they used to in ten hours.

In this country, of course, we have had a great deal of the eight-hour day but it is very far from being universal. I do not recollect the percentage, but it is only partial. Now, in any consideration that we give to our own affairs in this country, to the prospects for our own business, we must take very seriously into account the situation in Europe, for the ideas that are being expressed from time to time that our export trade is immaterial, being only a small percentage of our total, that we can in fact get along all right without Europe, is the worst kind of nonsense. It is unnecessary to dwell upon the nature of that nonsense among a group of men who are largely interested in the production of copper. This country is not independent of Europe. Its affairs are very closely interwoven with those of Europe. We cannot expect to approach a period of unparalleled prosperity, which some optimists are seeing about six months from now, we cannot hope to have anything of that sort so long as the situation in Europe is what it is, and in fact the situation in Europe is today as bad as it can be and has shown but little if any sign of improvement.

In this country we have had since the beginning of this year unquestionably some improvement in the physical volume of our business. It has been of a rather curious nature. It has been concentrated especially in a great burst of activity in building houses and also in the manufacture of automobiles. To some extent there has been also an improvement in the building of locomotives and railway cars, but to no such extent as in the building of houses and automobiles. In the other manufacturing industries there has been but slight improvement, if any. In retail trade there has been a decline. There are a number of important factors which make negative signs. In building analyses all the data show that the great activity has been and is in the building of dwellings. Next in order is perhaps the building of schools and other public affairs. In the erection of industrial and business buildings there has been only slight progress.

Analysis of the automobile-manufacturing business tells a similar story. The great progress has been in the construction of pleasure cars. In the construction of trucks there has been but little gain, but little advance. We might carry the analysis further. Out of the pleasure cars the construction of those other than Fords has gained most rapidly. Up to the present time the

business of building Fords has rather lagged behind, but right now there appears to be a change in that situation, with Fords going ahead at a great rate.

The building of dwellings that has been going on in recent months, is inspired of course by the attractiveness of high rents. The building is to a large extent speculative. It has been promoted in many quarters by abatement from taxation for various periods or there have been given other kinds of artificial assistance. This building is going on under conditions of construction costs that are still very high, somewhat off from the peak, but still at about 1.75 to 1.85: as compared with the immediately pre-war costs. This speculation in building looks to me as not unlikely to have the same kind of result to the speculators or investors, involuntary or otherwise, as did the purchase of copper stocks in 1917. The construction of automobiles for pleasure purposes on the unbridled scale of the present time, assisted also by the same kind of easy money that has been instrumental in promoting a boom in the stock market, seems to me also to be holding out ominous signs. We are certainly not experiencing any kind of recovery in the economics and affairs of this country as would justify our people in buying new automobiles and running older ones on the scale which they are doing.

These branches of activity which constitute the main improvement in business in this country since the beginning of this year find faint and very precise reflections in our metal markets. Of all of our metals, lead has been and is still strongest. Why? Because lead is especially required for building, both for painting and for plumbing, and because extensive manufacture of automobiles and the operation of old ones creates a large demand for storage batteries, while incidentally the radio telephone craze has contributed to that demand, and lead supplies being not so abundant as some others, the lead market is naturally and quite properly exhibiting considerable strength.

There has also been a strong demand for iron and steel, called for largely in automobile construction and indispensable railway work that could no longer be delayed. I doubt if the demand for copper has increased in the same proportion. The electrical-manufacturing industry, which is the mainstay of copper, has certainly not improved in anything like the proportion of improvement in automobile manufacturing. Of course, the increase in automobile manufacturing itself does create a rather important increased requirement of copper. I suppose that the average automobile of the present time carries around in its make-up about forty pounds of copper in all forms.



Zinc has not perhaps participated in the new demands so much as lead but after all the zinc business for a time is not going to be so bad as for a while it has looked. Indeed, we may have for a time a pretty good business in zinc following the exhaustion of the invisible supplies.

I do not think that this country is yet anywhere near being through with its process of readjustment. In some directions yes, but in a great many, no. It is almost futile to hold that following such an upset in everything that we, in common with the whole world, passed through in the six years, from the middle of 1914 to the middle of 1920, is going to be corrected in the short space of a year and a half or so. I date the beginning of our readjustment not from November, 1918, but from about the middle of 1920, and it did not get really going until nearly the end of 1920. In the period between November, 1918, and July, 1920, although the armies had ceased from killing and maiming each other, the people of the world were pursuing the same policies of extravagance in living that they had learned to do during the war. The real reverse did not begin until Europe had exhausted the credits that we had given to her. The very conditions that have tempered this readjustment, that have averted financial crises such as followed the collapse in 1907, which was the result of adverse conditions manifestly inferior to what confront us now have been retarding. That we have had no such acute financial disturbances has been due to our Federal Reserve System, but that in itself, *ipso facto*, has been delaying in its action. Similarly, the gingerly way in which our labor situation has been handled, the effort that has been exhibited in many quarters, perhaps in all quarters, to bring labor down as easily and gently as possible, also has been, *ipso facto*, a delaying element. But while the outcome may be postponed, it cannot be avoided. It has got to come about. We cannot continue to go on and do our work and function industrially with any success so long as we have such conditions as that in which the United States Labor Board requires the railways to pay fifty cents an hour for the same kind of labor that private persons get for thirty cents an hour a hundred yards away. Such a condition as that is illustrative of many maladjustments existing all over the country, which cannot be permitted to exist. The natural course of events will prevent them from continuing to exist, but until those maladjustments have been mainly corrected, the sure foundation for national prosperity, or such national prosperity as we may be able to enjoy without the full co-operation of

Europe, until such a foundation has been laid, we can hardly think of even beginning to return to normality. I thank you. (Applause.)

**The Chairman.**—I think Mr. Ingalls has given each one of us a good deal to think about and I am perfectly certain that there are large questions that each one would like to ask and there will be later an opportunity to do so. We have with us to-night Mr. Sam Lewisohn who has stated that he will talk to us on certain conditions regarding labor. I am sure we will all be glad to hear from Mr. Lewisohn. (Applause.)

**Mr. Lewisohn.**—The old adage goes, "Who shall decide when doctors disagree". But after Mr. Ingalls' authoritative address on present-day economics I feel that I know just about enough about economics not to discuss quantitative economics, business cycles or index numbers. I do want to say however, that I agree with him very heartily that the maladjustments in our wage system will have to be corrected. I feel that the disparities that exist between wages in different industries are retarding influences to a returning prosperity.

On the other hand, I am not quite so sure as to his conclusion as to the effect of the adoption of the eight-hour day in France and Germany. His conclusion seems to me to be a "*non sequitur*". I would be interested in learning later who the persons were who informed Mr. Ingalls that the adoption of the eight-hour day has been the cause of the decrease in productivity in those countries. It seems to me that there may be other causes, Mr. Ingalls; for example, the physical depletion of the population of those countries due to their war experience. Their physical stamina and their moral stamina were seriously depleted after what they had gone through during the great war. It therefore seems to me that the decrease in production could not possibly be said to be due solely to the adoption of the eight-hour day. Though it is very difficult to find data that is conclusive, experience in this country on the whole seems to be rather favorable to the adoption of the eight-hour day in most industries. I know as far as we have adopted it in any plants in which we are interested, the results have been encouraging.

But I shall shift the basis of the discussion and getting away from quantitative economics, shall discuss rather the question of the human and the dynamic conditions in industry. It is a commonplace that the tendency of the last few decades has been to emphasize the mechanical at the expense of human relations. A large part of the progress that has been made in mechanical af-

fairs has been due to the fact that here we have a field where results can be measured and where quantitative methods can be used. The utilization of these methods has made possible the extraordinary results that have been accomplished and which have been a constant source of wonder to those of us who are laymen. Certainly our best minds seem to have been absorbed in the mechanical and not in the human side of things. This is largely due to the fact that in this realistic age of ours we prefer results that can be measured. It has been peculiarly true of industry. Industry has gone ahead by leaps and bounds on this practical mechanical side, but much less progress has been made on that side which has to do with the organization of human relations.

The following excerpt from an article which appeared in *The Atlantic Monthly* from the pen of the English manufacturer, Mr. B. Seebohm Rowntree, is interesting in this connection. Mr. Rowntree during his visit in this country last Fall took occasion to go through a large number of the manufacturing establishments in the northeastern portion of this country. His observations follow:

"No one can carefully observe modern industry without being struck by the difference between the way in which the average employer approaches the solution of technical difficulties in his business and the way in which he approaches labor difficulties.

"I have just visited a large number of factories in the United States, and I have been amazed by the high degree to which research departments have been developed.

"But when the heads of these factories pass from the technical to the human problems of industry, the scientific spirit seems to leave them. Their dealings with 'Labor' are comparatively crude and unscientific, and are characterized by the very 'rule-of-thumb' policy which is so rigorously avoided in connection with technical problems. There is none of the spirit of the explorer, of the research student, in the dealings of the average employer with labor problems. He is inclined to take things for granted—to accept theories which he has never examined."

Now, that statement is a very interesting one, coming as it does from a man who is a very close student of labor problems, one of the authorities on that subject in England, and who himself has a plant that employs upwards of four or five thousand men.

I think I may say that you engineers are particularly at fault in this respect. I have found that engineers, young or old, will discuss questions of mining methods or of assaying, *etc.*, by



the hour, engineers who on the other side are bored when any attempt is made to interest them in any brand of personnel problems such, for example, as foreman training. I have been told of other engineer executives, men in responsible positions at the head of very large organizations who have neglected personnel problems because their chief interest lay in "theories of balance". Now, the problems of organizing sound relations in the factory and the mine are sort of a mixture of politics and salesmanship and to the type of mind trained in mechanical pursuits this is apt to be distasteful from an intellectual point of view.

Though there has been a neglect of all sides of the personnel problem, it is particularly true as to the relations between management and the common workmen; that is, the rank and file. With respect to these relations between the management and the rank and file the difficulty is not only one of general neglect because of absorption in other problems, but is also due, I think, to the class consciousness which has resulted from the history of the labor movement that has created barriers which present a special obstacle. I am not now referring so much to the class consciousness of the rank and file themselves, but rather to the class consciousness of management. I feel that Marx has sold his theories not only to some groups of the working class but also to many groups of employers, engineers and managers. The attitude of some members of the employing ranks to their employees seems to be inspired by a mixture of fear and ignorance. We have heard much of the inferiority complex. There is also a superiority complex.

Industrial politics are therefore distasteful to many managers for more reasons than one. There have, of course, been other reasons than the two above mentioned—that is, those of absorption in mechanical pursuits and class consciousness—why these problems have been neglected. It has appeared superficially to many business leaders that profits were more dependent upon skilful financing, purchasing or salesmanship. But in recent years business men in general and you engineers in particular, are beginning to realize that for various reasons it is imperative that we come nearer to solving the problems of working out relations between management and the rank and file.

The first reason that suggested itself as an argument for paying more attention to creating a better understanding between employers and employes is the necessity of a greater productivity. This is an argument that will particularly appeal to you engineers. You have come to realize that productivity

depends not only on good engineering and good mechanical devices but upon effective personnel admiration. A machine can be bought but we must get co-operation from our employees. And let me suggest, there is no use of weeping because we don't get that co-operation. It is strictly the responsibility of management to secure it. Management should not set up an alibi by blaming labor for their failure to do so.

But there are other cogent reasons for properly organizing human relations in a plant than that of anticipated gain in productivity. For example, we are all interested in the creation of sound human values and if in our factories the handling of personnel problems is ignored we cannot have those sound human values in the community. And a third reason is this: It has not been sufficiently realized that the very best melting pot for social classes is in manufacturing establishments. It is not only a question of a proper understanding between the manual laborers and the monied classes, but also of a proper understanding between the manual laborers and the intellectual and professional classes. It is most important that the rank and file appreciate the value of brains in our social structure. Unless engineers and other professional groups sell themselves to the rank and file in the plant and in the factory, I do not know how this appreciation can take place. The situation in Russia, the situation in Italy, demonstrated that the workers had no sympathy with the intellectual or professional groups. It is a warning to engineers and professional groups generally that they must give more attention to industrial politics.

Now in approaching these problems there are two mistaken attitudes that management should guard against. One of these attitudes is to inveigh against labor, the other is to patronize labor. As far as blaming labor, management must realize that they have assumed the leadership and that they have the responsibility of getting results. It is they that must take the initiative in establishing any sound industrial relations and meet labor more than half way. There is no more use cursing labor in public or private than there is cursing a refractory engine. It does not solve the problem. You engineers must approach these problems with the same poise and perspective with which you approach other problems.

Now, on the other hand, it is worse than futile to approach labor in a patronizing manner, particularly in this democracy of ours where we all claim to be regular fellows. I am not one of those who believe in industrial democracy, so-called, though I do believe that the desire of the workmen for a certain amount

of self-expression should be recognized, satisfied and catered to. It is even worse than futile to preach to the workman and to tell them about their economic duties in a sort of a better-than-thou attitude. The way to reach their minds and their hearts is by giving them a square deal and this can only be done if proper attention is given to problems of human organization in the individual plant and real leadership is given them.

Of course, after and only after the confidence of the men has been secured management can very properly discuss the economic condition of the particular industry and the country with the men and if this is done in a non-patronizing spirit, with sufficient tact, real progress can be made and has been made in this direction. Mr. Hook of the American Rolling Mill Company is very much interested in this phase and much progress has been made in the plants of the American Rolling Mill Company, in this direction.

When I spoke of the necessity of organizing human relations in the plant I did not mean by any means that the management should adopt the latest fads and fancies. Just as in governmental politics so in industrial politics there is no one method that can be recommended as fitting the particular case and it is a question of working out the method best suited for the particular plant or organization. For example, when a manager is a natural born leader and the plant is sufficiently small the problem of maintaining the *esprit de corps* is relatively simple, though even in such cases careful organization is necessary. But it is not always possible to secure a manager who is a genius at organization and in many cases the plant is too large to permit of management exercising a personal influence. In such cases a carefully thought out plan of employee's representation and a well organized service department will help to solve the problem. The main problem is that of making certain that as much time and attention are devoted to these problems as are devoted to other problems. I have seen really remarkable results brought about when this attitude is once assumed. We Americans are ingenious people and it seems to me that there is no earthly reason why we shouldn't be able to solve these problems of industrial politics as effectively as we have mechanical problems. It is a question of the will to do and our ability to rid ourselves of our hitherto subjective attitude. The matter is mainly one of emphasis and the important thing is that the personnel problem as far as it applies to the rank and file be recognized as a major problem and not a minor one, as it has been in the past.



Now, from what I have said I do not mean to suggest by any means that there are no points where the interest of employers and employees are antagonistic, for we must recognize that there are many points in which they are, but this does not mean that there is a large area in which controversy plays only a minor role and which involves the continuous and constructive every-day problems. You and I can go out as employer and employee and when we are through bartering recognize that we must work together.

Particularly in working out relationships with unions, we must realize that labor organizations thrive on conflict and can almost always beat the employers in a fight. While labor unions are often administratively a nuisance they should be recognized as absolutely necessary organs for social improvement. Under non-competitive conditions where management has properly worked out the human relations they become unnecessary as far as the welfare of employers or of society are concerned, but the way to prevent their intrusion is by constructive treatment of the problem and not by warfare.

Now, the question of the distribution of the profits of an industry is of course a difficult one. Mr. Ingalls has alluded to the researches conducted by the Bureau of Economic Research. According to that Bureau I believe that about seventy per cent of the net value of the product of mines, factories and transportation went to the manual and clerical employees in 1918. The question of distribution does not therefore seem to be as important a problem as the problem of getting a larger national dividend and getting it with a minimum unnecessary friction. Mr. Hoover has said in his "Principles of Mining" that you engineers are the buffers between capital and labor. I do hope that you are going to act your part. (Applause.)

**The Chairman.**—I am sure we all feel very much indebted to Mr. Ingalls and Mr. Lewisohn for these two talks and I am certain there are many subjects which you will wish to discuss. I am pleased to call on any of you who wish to discuss or ask questions regarding the talks.

**Mr. Washburn.**—Mr. Chairman, may I ask Mr. Ingalls to please explain a little more in detail the remark he made about the unusually low interest rate now prevailing. I thought perhaps you might be willing to give us a little more detail as to why it is prevailing at this time.

**Mr. Ingalls.**—I do not think I touched on that subject. Never mind that. The low interest rates are obviously the re-

sult of the release of funds from what last year we referred to as frozen credits; they are a reflection of easy money.

**Mr. Channing.**—Mr. Otto Kahn's explanation is that on account of the present industrial conditions, and the failure to reduce the high wages paid in certain basic industries, also on account of the income tax with its elimination of taxation for the people of lower incomes and the gradual increase in the rate as income goes up, that there isn't the tendency on the part of those controlling capital to invest it in industry. The capital which has become liquid in the last year and which should go into industry is used either for speculative purposes or is used for buying tax-exempt securities. The proceeds from the sale of those tax-exempt securities is used in building roads, public works, possibly in lighting plants, and in building those things which in reality the country does not need, the things which are not of the greatest and most vital importance. The major thing that Mr. Kahn brings out is that because of this irregularity as he expresses it or the want of balance in our method of income taxing that this money is not put in industry and is being used for speculative or other purposes.

I'd like to ask Mr. Ingalls a question. In view of his statement that during the last three or four years there has been no increase in our capital in the United States, that is, that our expenditures have been about equal to our income, it has been a surprise to me in the last few months to see this large amount of available funds represented by credit suddenly coming to the front and I am wondering where it really comes from, whether it really does represent savings or not. What do you think of it, Mr. Ingalls?

**Mr. Ingalls.**—I think there is a general confusion among the subjects of wealth and capital and credit and funds. In order to express our capital goods, or our wealth in the aggregate, they have got to be put in the term of dollars so as to arrive at the total goods. You cannot add ships and automobiles and houses and get any total. Now, in order to arrive at any total then we have got to assume some kind of a dollar and we have assumed the dollar of 1913 as that kind of a dollar. Expressed in current dollars wealth and capital both may fluctuate very greatly and through fluctuations upward give rise to the opportunity for the creation of an inflated volume of credit which may in the end prove to be quite fictitious, but in the process of readjustment to wipe out the fiction that exists there may remain enough to give the appearances during a time of readjustment of a great abundance of credit.

**Mr. Moulton.**—I don't believe economists generally have given full realization of what the effects of the extension of credits have been. These funds have come back to city banks and they are back in New York. Probably the figures are multiplied several times, coming back through frozen credits from country districts, and the apparent multiplication from bank to bank.

**The Chairman.**—I think Mr. Rogers of the national society will have something to say to us.

**Mr. Rogers.**—It has been rather surprising to me that this discussion reveals that as engineers we take so much more interest in Mr. Ingalls' talk on economics which have little bearing on engineering than in what Mr. Lewisohn has said. Mr. Lewisohn says that as engineers we are not doing what we ought to do with the labor question. I think he is quite right. Some time ago we had a committee, I think it was called the Committee on Vocational Education which rendered a very admirable report and it was a great disappointment to me that the Society at large took so little interest in it. We should be more interested in all human relation subjects. A few months ago we had here Mr. Wiley, manager of a coal property over in West Virginia. He told us at great length about his experiences with the union and how he handled things. He was an example, it seems to me, of an engineer who understood human relations and so got along finely with his men even though they belonged to the coal-miners' union which is said to be about as bad as there is. I think that Mr. Lewisohn's point that we, as representatives of the *intelligenzia*, ought to be leaders, is mighty well taken. The labor leaders are teaching their followers a lot of false doctrine. I think I spoke the other night of the Textile Workers' Union, which has in its constitution the declaration that the products of industry belong in their entirety to labor. I have no doubt that the bulk of the members of the union really believe that and the only remedy for such a condition must be education. We presumably have more brains than the bulk of the people and we ought to devise some way to show them that such cannot be the case. This is why to me it is a very interesting thing that this National Bureau of Economic Research is establishing the actual figures showing the distribution of the products of industry between labor and management and property. These subjects are of vital importance to us as engineers and managers and we ought to give them the closest thought and attention.



**The Chairman.**—Mr. Channing, you were at the Tennessee Copper weren't you, when the change took place from the ten to the eight-hour shift?

**Mr. Channing.**—No, I wasn't there.

**The Chairman.**—Was Mr. Gottsberger there at that time?

**Mr. Channing.**—No, it was after we were both out of the direct management.

**The Chairman.**—The victim evidently isn't here. I knew that company had gone through that process and I thought we could get some definite data on it.

**Mr. Channing.**—I was going to say that I just got yesterday from Mr. Wallace, the Secretary of the Federated American Engineering Societies, the preliminary mimeographed copy of the study of the two versus the three-shift. I haven't been able to read it. That is a very careful investigation that was made with a good supply of funds behind it and I think in a very short time it will be published in book form and then we will get a very good exposition of it. As I remember, I think both the experience in Tennessee and at the International Nickel Co., was that at the start-off on the change from the two twelve-hour shifts to the three eight-hour shifts there was a marked increase in costs, which, however, in a few months largely disappeared. I must say that I agree with Mr. Lewisoehn and am more in doubt of Mr. Ingalls' statement that a large proportion of the want of productivity is due to the change from the longer shift to the shorter one. I think as Mr. Hoover very properly said, there is no fixed number of hours for a day's work; it depends very largely upon the industry. For example, if a man is running a crane in a smelting works you can't work him twelve hours. In fact, in Tennessee we used to have our crane runners work six hours.

Now, from a purely economic point of view there is no earthly reason why a tapper in a furnace shouldn't work twelve hours, because all he may have to do is tap once an hour. He works pretty hard for fifteen minutes and then sits down for the rest of the hour. If we were to look at it, however, from a social point of view, the question is what kind of a citizen do we make out of that man if we have him working thirteen hours one week and eleven hours the next week? On the contrary, however, we must realize that there are certain types of foreigners who come over to this country whose

mentality is low and always will be low. There are men who would pass possibly Class D in a psychological examination and that man wants to earn all the money that he can and it is very doubtful whether he could ever be improved by changing him over from a twelve-hour shift to an eight-hour shift. Mr. Drury's figures on the steel industry were that the cost of making steel would be increased very slightly, I think two and a half per cent if my memory serves me correctly, in the change from the twelve-hour to the eight-hour shift. I am rather in doubt whether later investigation showed that figure to be right, I think it would cost more, but my experience extending over thirty years at Lake Superior and other places have indicated to me that a man working underground in an eight-hour shift will do just about as much as he will do on a ten-hour shift. It is extremely difficult to determine these things because other factors come in, such as improved machinery and improved methods.

**Mr. Ingalls.**—It was not my intention to enter into any discussion of the eight-hour day and its effects. I was rather confining myself to the reporting of certain evidence. Mr. Lewisohn, I think, misunderstood me as implying that the decrease in productivity in Germany was the consequence of the eight-hour day only. I think that I said that that was among the causes; if I did not say that I intended to, but the fact remains that in Germany where for upward of three years they have had the eight-hour day by decree, and in France where they have had it by law, in both of those countries the employers as bodies are appealing to the Reichstag and the Chamber of Deputies respectively to relieve their industries of the consequences.

I am aware of a great many studies that have been made in this country as to the eight-hour day and its effect on production. All those studies of which I have seen the results have impressed me as being inconsequential. We have in this country perhaps more than in any other the play of two opposing factors, the tendency on the part of labor to do less work, and the effort on the part of engineers to counteract that, up to recently anyhow, the efforts of the engineers in very many cases have been superior to the impairing factor.

In many cases where the same production has been maintained with the eight-hour day as with the ten-hour day or where there has been a greater production, and I know that there have been some cases of such a result, I feel sure that it has been the engineer and manager who have been responsi-

ble for the increase and not the invigoration of labor. It has seemed to me that in order to arrive at any true result as to this question, we must have either a study of some major industry in which the engineering influence by natural conditions cannot play a large part, such, for example, as bricklaying. We cannot mechanicalize bricklaying very much, even if we want to. If we could have a thorough study of bricklaying or some other work of a similar nature, we might get some ideas. As to the results in some country where the eight-hour day has been tried *en masse* as it has been tried in France and Germany, the evidence there has been of the nature that I have reported.

Referring to a suggestion that Mr. Rogers has just made as to the interest in this subject, it is all just as he has said, both as to the interest and the importance of the thing, and because the subject is so important and interesting the science of economics has been converted from the old characterization of the dismal science into something which is of live interest and engages the attention of everybody. Only today I received a letter from the manager of an important industrial company asking for data which he could report to his men in his factory and show them how they were really faring and how they compared in their division of production with the general division of production throughout the industry of the country, and from every quarter we get the same reaction.

Now, I think that before we get very far in our approach to the contacts that Mr. Lewisohn has so lucidly suggested we have got to convince working people generally of the facts and get out of their heads the idea that they are entitled to the entire produce of industry, or the other idea that they get only twenty-five per cent of the produce. There are some of the labor leaders who are perhaps beginning to get correct ideas.

**Mr. Goodale.**—An eight-hour law was passed by the Montana legislature twenty-one years ago. Thereafter for a period of two or three years we found there was no marked decrease in efficiency, figured on the basis of tons per man per day, when compared with the years just previous to the passage of the law.

**The Chairman.**—With no change in equipment?



**Mr. Goodale.**—There were of course some improvements in equipment and methods, but not enough in that time to affect our conclusions, which were, that the limit of human endurance, or of effective work underground, was reached in eight hours. In later years, the influence of the Industrial Workers of the World was apparent and “striking on the job” was practiced by many of the workers. As wages went up, on the basis of increased price of copper, our experience was the same as elsewhere—efficiency went down.

In the reduction works of Montana, the eight-hour law had the effect of increasing the labor costs nearly fifty per cent, for three men were required in work on the concentrating machines and around the furnaces, where two were employed before.

**Mr. Lewisohn.**—One of the reasons I raised the question as to the conclusions that Mr. Ingalls suggested; that the eight-hour day was the most important factor, if not the only factor, in decreasing production in France and Germany was the fact that only recently there was in our office a representative of one of the largest, I might say the largest copper group in Germany. He incidentally mentioned that they had adopted the eight-hour day in all the industries with which he was connected and he seemed to be very well satisfied with the results that had been attained through the change from the twelve-hour to the eight-hour day. Of course, that is merely an isolated example and we can't arrive at any definite conclusions from that, but it does indicate that we don't necessarily want to jump to the conclusion that the decrease in productivity was due to the adoption of the eight-hour day. There are so many causes that enter into this question of lack of efficiency on the part of the individual workmen. I remember at one time—it was during the war—there was a good deal of discussion as to the decrease in efficiency in the individual workman and it was thought to be due to his innate cussedness. I happened to make some inquiries at the time and I found a large part of it was probably due to the convalescence after the influenza epidemic at the time. As you remember there was a severe influenza epidemic and people who had suffered from that disease were weakened considerably and the workman as well as other groups.

Now, as far as Tennessee is concerned, I can only speak

as a layman, but I will say that our present manager who succeeded Mr. Gottsberger has told me that he is more than satisfied at the change. There we had blast furnaces and there was quite some question as to whether we could adopt the three-shift system. Our manager seems to be more than satisfied that this change has not caused any increase in costs; in fact, he believes that possibly there has been a decreased cost. I agree with Mr. Channing that things being at all even it is also a question of the human values involved and that it is important if you are going to have sound citizenship not to have our laboring men work such hours that no time is given to them for the ordinary recreation and educational pursuits that will make their lives more worth while. For two years we had there the idea of one man for one job. Well, when Mr. Houser got appointed he had to cut corners on all sides. That thing was very soon abandoned and we got men who could do half a dozen different jobs during the day and keep themselves busy the whole time and in that way we were able to eliminate some unnecessary men.

**Mr. Channing.**—One statement that was interesting was made in England during the war during the production of munitions in a series of pamphlets published by the Government and one of them was the distinct statement of a certain manufacturer of munitions that when he started at his factory there was a great lot of enthusiasm and all the workmen insisted upon working twelve hours a day seven days a week; that is, eighty-four hours a week and that in process of time they started to go to pieces and couldn't do it and eventually he got down to six days a week, eight hours a day and this man stated that on a forty-eight hour week he actually turned out more munitions than he did on the eighty-four hours. Now, I presume that that is an extreme case. In the Lancashire districts the conditions were the same as Mr. Goodale stated. The product of the loom depended on the way they worked and if a man or woman tended the loom only eight hours instead of ten or twelve hours undoubtedly there was a falling off in production per man. That is bound to come in any industry where the workmen are merely tenders of machines and in which the state of the machine is the main factor. There, however, was a compensating factor in that and that was that when the tender of the machine worked four hours

less there were less goods returned; in other words, the quality of the goods was improved, which to a certain extent offset the increased labor cost.

**The Chairman.**—Is there any further discussion?

**Mr. Fernald.**—There is one question I would like to ask. It is as to how, in this discussion of the quantitative theory, Mr. Ingalls takes into consideration the costs of distribution. I am wondering how, in the quantitative discussion, consideration is given to the increase which has come in the cost of distributing the product.

**Mr. Ingalls.**—I do not know whether I understand you or not.

**Mr. Fernald.**—As I look over the situation in the country today, it seems to me we have done pretty well with our manufacturing proposition. We have to a considerable extent counteracted increase in labor by improved methods. Our large manufacturing establishments have not had their cost of manufacturing increase as much as the cost of distribution has increased. Do you, in your quantitative discussions, take into account this increased cost of distributing the goods to the consumers?

**Mr. Ingalls.**—You mean in the estimate of the national income?

**Mr. Fernald.**—Yes, and in the results which are derived from looking at the national income from the quantitative standpoint.

**Mr. Ingalls.**—Quantitative examination simply means the measuring of things. In the estimation of the national income the value of transportation and services in distribution naturally come in.

**Mr. Fernald.**—I mean the selling, the retail expenditure.

**Mr. Channing.**—He means if the factory cost on a pair of shoes is \$2.56 and sells at retail at \$7.50, isn't that \$4.94? Isn't that too large? Isn't that what you mean?

**Mr. Fernald.**—Now, does that enter in the quantitative consideration of the income?

**Mr. Ingalls.**—Of course, no estimation of national income



which is expressed in the aggregate of forty billion dollars goes into detail, but the costs you suggest are reached under the general head of merchandising.

**Mr. Fernald.**—The labor cost of the retailer and his clerks, etc., would all come in as part of the cost of a pair of shoes?

**Mr. Ingalls.**—Yes.

**Mr. Fernald.**—Without distinction as to whether it is part of the manufacturing cost or the distribution cost.

**Mr. Moulton.**—I'd like to ask Mr. Lewisohn a question on the angle of human relations of labor and that is in what way can a management which hasn't had a background of labor experience, come to understand how the labor condition is? It seems to me the question of just how those in charge can come to understand what is the thought of a man whose entire background of life is so different than his is perhaps one of the real underlying questions of coming to a relation and understanding and proper dealing with labor.

**Mr. Lewisohn.**—That is a question largely of education. Mr. Channing and I are interested and others are interested in having included in the curricula of engineering schools thorough courses in the subjects dealing with the handling of human relations. I know Dean Kimball who is the present President of the Society of Mechanical Engineers is very much interested in this matter. It is of course true that there are a number of men particularly among engineers who have purely a mechanical turn of mind and who therefore are not equipped by nature to handle the human side of industry. Now it comes about quite often that because of the increasingly mechanical nature of our industries that such men are put in charge as the responsible managers. The point I make to cover such a case is this: that through his initial training such a man should have been sufficiently impressed with the importance of the proper handling of human relations to induce him, since he personally hasn't got the taste or inclination to deal with them personally, to delegate that branch of his responsibility to somebody else just as he would delegate any other function. In other words, if a manager has the time, inclination and temperament to handle the problems of human organization himself he should do so and if he hasn't the time,

inclination or temperament it is important that he should know enough about the subject to realize the importance of having somebody else pay attention to it.

The difficulty I find is that the subject has been too much ignored in engineering circles. As the engineers are becoming more and more the men who are in charge of industry, there is a danger of a condition arising where the human side of industry will be entirely ignored and to answer Mr. Moulton's question, the awakening of the young man's interest in this subject can best be brought about through his initial training at the professional school which he attends.

**Mr. Channing.**—I can tell you something along that line and that is the work that the Industrial Service Movement of the Y.M.C.A. is doing. Mr. Fred A. Rindge, Jr., a Columbia graduate, is secretary of that particular branch. He has just finished a swing around the country in which he has gone to a large number of engineering colleges and in which he works to get the faculty to introduce a course of human engineering. Of course, that would be a mere series of lectures, but one of the practical things in which an attempt is made to give the young engineer the point of view of the workman in inducing that young man, particularly if the college is in an industrial center, to volunteer for work among laborers; to go out, for example, and find a lot of Greeks working on a railroad and living in a box car, going to those men and getting acquainted with them and starting to teach them English, and perhaps when they get a little further advanced teach them mathematics. Some of the others teach them drawing. When the young man goes out and volunteers for this work, of course the effect on the workman is good. One of Rindge's stories is of one of his early days of going to this box car where these Greeks were and finding it a dirty car, the men in the clothes that they had worn all day. He was giving the first lesson on Monday. He said he came around Thursday to give them a second lesson and he found that they had taken off their old clothes and put on their best Sunday clothes as they appreciated what he had done for them and felt it was up to them to show their appreciation.

That is a good thing for the workman, but the interesting part of it is the reaction it has on the young engineering student. During his college days when he gets an opportunity of seeing

the workman and talking with him he does imperceptibly get some of the workman's point of view and when he goes on in industry his mind is not just a blank in regard to the workman and his point of view. He has had this year's experience two or three nights a week and he has got some idea of what the workman's point of view is, so when he goes out on the job he does know something about it.

The one man that Rindge points to more than anybody else is a Columbia graduate who volunteered for work of that kind, finally went to Lake Superior and started underground as an engineer in one of the copper mines. In a relatively short time, a few years, that man's understanding of the workman's point of view was such that he became superintendent of the mines and probably there are no mines on Lake Superior where the industrial relations are better than these mines and you can trace it all back to this young man when he was at Columbia volunteering for this work, being thrown in with workmen and getting their point of view. Of course, it is very nice if a man does come out of college and get an opportunity of working as a miner or working around a furnace, but we can't all do it. I know when I graduated from college there were so few engineers in the country that man didn't have a chance to do that. Then engineers were grabbed up and had to do real engineering work. I think probably that my experience came from about three years in Lake Superior in which I was exploring for iron ore and during that time I had from one to five camps out in the woods and I'd go around to those camps and I'd have to sleep in the same bunk house and eat at the same table with the men that worked with me and that three years of constant close contact with the laboring men gave me a very good idea of the mental attitude and the process of reasoning of the laboring man.

Now, just as Mr. Lewisohn says, if the manager hasn't got that he has got to realize that he must get some one to do that just exactly the same as he'd get a research man or a chemist. I wouldn't be able to go into a laboratory today and do any work, I wouldn't be able to run a transit, I wouldn't be able to make experiments myself. Now I'd get a man to do it. If I felt that I wasn't able to handle my personnel work and my mine was large enough then I'd see that I got a personnel manager and turn that matter over to him.



**Mr. Rogers.**—It is getting pretty late, but I'd like to express myself on this subject; I think I have done so before. I think such work as Mr. Moulton talks about is absolutely time wasted. A manager who gets along with his men would do it whether he had pushed a car or pounded a drill or not. A man who gets along with his men is generally of a type referred to as a good mixer. There are some men who are naturally snobs and if they had pushed a car ten years, they'd still be snobs. We have all of us been children and we know some people children run to naturally. Other people can't make themselves agreeable to children no matter what they do. None of us have been dogs, yet there are some people to whom dogs take naturally, and other people whom they don't take notice of at all. I don't believe it is necessary to work as a laborer to get an understanding of the laborer. You have got to get in contact with him in directing his work and if you're the right sort of a chap you will know what he is through that contact.

**Prof. Peele.**—There is no doubt that a sympathetic manager will always be met with a reasonable response when he deals with an individual employee. But sooner or later most managers find themselves up against a labor union, contact with which becomes impersonal. One of the greatest difficulties in dealing with labor unions is the fact that they have no standard which, when attained, would be considered satisfactory. If wages are increased once, the union leaders see no reason why they should not be increased again, and the increases will be forced whenever circumstances are favorable. If there were some ultimate standard, acceptable alike to the union leaders and members, the whole labor situation would be simplified and relieved.

When Mr. Ingalls spoke of his views regarding the course of wages in the future, I wanted to ask him if he had formed any idea as to the probable trend of the price of labor during, say, the next six months or a year.

**Mr. Ingalls.**—That question has certainly not been given any consideration by the National Bureau of Economic Research. If you ask, however, for my personal opinion about wages in the course of the next six months I should not venture to express any opinion excepting to see more or less

chaos and continuation of the maladjustment. I do not think that the outcome is going to be reached in any time so short as that. In the end my opinion is that wages in general will be at the level of 1913 and maybe lower. That is, however, purely a matter of opinion.

**The Chairman.**—The hour is getting late and if there is no further discussion I would suggest a rising vote of thanks to Mr. Ingalls and Mr. Lewisohn who have given us such an entertaining evening.

# Mining and Metallurgical Society *of America*



BULLETIN  
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Printed in U. S. A.

# Mining and Metallurgical Society of America

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## ANNOUNCEMENTS

**Annual Meeting.**—The annual meeting of the Mining and Metallurgical Society of America will be held at the Harvard Club, 27 West 44th Street, New York, on Tuesday, January 9, 1923. The first session of the meeting will be called at 3:00 p.m., and will be devoted to business. The second session will be held at 8:30 p.m., preceded by the usual informal dinner at 6:30 p.m.

**Medal Committee.**—The Committee for Award of the Gold Medal, consisting of Doctor H. M. Chance, and Messrs. J. H. Allen and L. W. Mayer reported the names of Robert Peele and J. E. Spurr to the President and Council for consideration. Ballots concerning these candidates have been sent out to the Council.

**Dues for 1923.**—The vote on the dues for 1923 showed:

- 99 Endorsing the recommendation of the Council for the voluntary subscription of \$10 in addition to dues of \$10.
- 30 Members voted against this recommendation.
- 1 Member voted for a voluntary subscription of \$5.00.
- 2 Ballots were blank.

**Bound Volumes for 1921.**—The bound volumes for 1921 are now in the hands of the binder and should be distributed very soon to all members who placed an order.

If the members will, by the middle of February, signify their preferences concerning the bound volume for 1922, an attempt will be made to have the volumes in their hands by May 1st.

**Sub-Committee on Tin—Committee Foreign and Domestic Mining Policy.**—Mr. G. Temple Bridgman has accepted ap-

pointment as Chairman of the Sub-committee on Tin, the other members being Doctor A. R. Ledoux and Mr. H. H. Alexander.

**Joseph A. Holmes Safety Ass'n.**—The President appointed Mr. Benjamin F. Tillson to represent the Society at the meeting of the Joseph A. Holmes Safety Ass'n.

**New York Section.**—The paper on the "Production of Electrolytic Iron Using Pyrite as Raw Material" given by Mr. F. A. Eustis on September 27, is printed in full in this issue. At this meeting it was decided to elect Section officers for the ensuing year at the last meeting of the year, instead of at the first, in order to give the newly elected officers a chance to plan their program during the summer.

The New York Section of the Mining and Metallurgical Society held a monthly meeting at the Harvard Club, on Wednesday evening, October 25, 1922. The subject of the evening, Aero Mapping and Exploration, was presented by Mr. DeShea of the Fairchild Aero Camera Corporation. Those present were as follows: Members—Huntington Adams, J. A. Church, Jr., J. V. N. Dorr, William Griffith, Louis D. Huntoon, W. R. Ingalls, Robert Linton, Donald M. Liddell, E. P. Mathewson, J. W. Mercer, H. G. Moulton, Francis R. Pyne, Forest Rutherford, Allen H. Rogers, Sidney Rolle, J. E. Spurr, F. F. Sharpless, C. W. Van Law, H. G. Wolf, C. M. Weld, and C. S. Witherell. Guests: C. S. Ackley, J. C. Anderson, J. K. Erskine, Jr., H. B. Fernald and brother, J. E. Hodge, C. E. Skouger, and the speaker of the evening, Mr. Jack DeShea.

The speaker of the evening, Mr. DeShea, was introduced by the Chairman, Mr. C. M. Weld. Mr. DeShea gave an interesting illustrated talk on the use of the aeroplane in connection with preliminary mapping for industrial purposes and the discussion brought out its application to geological work and mining developments. This is given below in outline only.

### **The Airplane in Industrial Mapping.**

The economic development of aëro-mapping was confronted with the development of the camera and instruments, and methods for interpreting the final photographs. In the past 5 or 6 years a camera has been developed which is entirely automatic, controlled by electric motors, and contains a film 9 inches wide capable of taking 120 exposures. Recently a tri-lens camera has been developed, consisting of three distinct cameras, using a single continuous film, and three exposures



are made at the same time. At elevations of 15,000 to 20,000 feet, areas 4 to 5 miles in width and 120 miles long can be photographed on one roll of films.

As brought out by Mr. DeShea the principal application to date has been in connection with city and industrial developments such as: Sectional views of cities for real estate dealers in locating industrial sites; recording building operations and territory left for building purposes; location of rights of way for public utilities, covering the most direct route and crossing the fewest parcels of ground without the owners knowing of such surveys; mapping of harbors, rivers and canals with relation to ship building and shipping facilities; and coast and geodetic surveys which can be completed within less than three weeks which would ordinarily require from 6 to 12 months.

Mr. DeShea further emphasized the work which is being done in connection with the survey of pulp and timber lands, stating that an experienced aviator can estimate within 5% the number of cords of wood within a given area, and determine the type or kind of wood, size and height of trees.

The discussion brought out its application to geological work, location of railroads, pipe lines, etc., also as a means of transporting engineers into new mining districts which by ordinary transportation might require several days or weeks.

The most important application of aëro-mapping to mining at the present time appears to be mapping preliminary to geological surveys: The discussion brought out the fact that certain formations such as the hummocky, granitic croppings are readily distinguishable from ridges comprised of schists and sedimentaries; and the further great advantage that in unexplored country the actual field work can be confined to the important formations which are exposed, thereby avoiding unfavorable areas such as lakes, swamps, and areas covered with drift.

At the close of the meeting Mr. DeShea extended a most cordial invitation to visit their plant, examine their records, and inspect in detail their methods of map-making, and of drawing final conclusions for their reports.

After a rising vote of thanks to Mr. DeShea and his associates the meeting adjourned.\*

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\*Further information can be obtained in a long article in the December, 1922, Proceedings of the Am. Soc. Civ. Eng., by Gerard H. Matthes, "Aerial Photography as an Aid in Map Making."

## The Production of Electrolytic Iron Using Pyrite as Raw Material

The electrodeposition of iron from solutions is not new for the operation was introduced and described more than half a century ago and the operation has aroused more or less attention since then. One Bockbushman is reported to have made plates of electrolytic iron deposited on copper in 1846. His plates were 150 m.m. square and 2 m.m. thick. About 1851, Smee introduced the use of different salts but found the cost prohibitive. In 1860, Klein made plates for engraving the bank-notes of the Russian Government out of electrolytically deposited iron, using a bath containing 5% iron sulphate and 5% magnesia sulphate with a low current density (0.1 to 0.3 amp. per sq. ft.) He needed 5 days to get a deposit 2 m.m. (0.076 in.) thick.

In 1875 L. Cailletet wrote on iron charged with hydrogen. In 1900 Merck in Germany described making electrolytic iron using 30 to 40 amp. per sq. ft. at a temperature of 70 deg. C.

Professor C. F. Burgess working in this country, was probably the first to make really considerable deposits of electrolytic iron. He published his work in 1904. He used for his bath sulphates of iron and ammonia at a temperature of 30 deg. C. He used 10 amp. per sq. ft. and had a resistance of only one volt. He used soluble iron anodes.

In 1905 Maximovitch deposited iron from a solution of the sulphates of iron and magnesia, adding soda ash continuously to keep the bath neutral. Foerster in Dresden about the same time deposited iron from a slightly acid bath at a high temperature—95 deg. C. using 20 amp. per sq. ft.

Cowper-Coles in England began his work on electrolytic iron probably at least as early as 1898 but published his more important results ten years later, in 1908. He preferred to use a sulpho-cresolitic acid bath at a temp. of 70 deg. C. with a current density of 100 amp. per sq. ft. He attempted to use oxide ore as a raw material.

Franz Fisher in Germany in 1909 made material quantities of iron, using very concentrated chloride solutions with a temp. of 110 deg. C. and a current density of 200 amp. per sq. ft. His metal was remarkably pure—report says 99.99%.

### SOCIÉTÉ LE FER—GRENOBLE

In 1910 the French Company, Société le Fer, which seems to be easily the pioneer in making considerable quantities of

electrolytic iron, took out its first patents. It used rotating cathodes, soluble cast-iron anodes, circulated the electrolyte over iron turnings to keep it neutral and worked with a high current density—100 amp. per sq. ft. It developed the practice of blowing air into the electrolyte to form what it calls an oxy-chloride of iron which is said to absorb the hydrogen that is liberated at the cathode. At one time its technicians thought that the speed of rotation of the cathode was important and they developed the practice of making a deposit on a cone so that they could tell what tangential speed gave the best results.

They have continued to improve the plant and have a real commercial proposition for France. (Picture of the plant shown.)

They have gone ahead and built other plants modeled on their experience gained here.

#### WESTERN ELECTRIC CO. HAWTHORNE PLANT

In this country, the largest operating plant to date is that of the Western Electric Company at Hawthorne, Ill. The telephone company requires special cores for its loading coils and it has found that electrolytic iron is the best material from which to make them. It deposits the iron in sheets (picture shown)—using steel plates for anodes, which dissolve, strip the deposit off the cathode still charged with hydrogen, and break it up in a ball mill. It then tumbles it with zinc dust and compresses it into a solid to form the core desired. I understand that it produces regularly about two tons of this metal per day.

In 1919 Mr. C. P. Perin and I were impressed with the results being secured at Grenoble (Mr. Perin saw the plant in connection with his work in Europe for the British Government following the Armistice) and we set to work to see if we could not make electrolytic iron from ores. We are both interested in the soft ores of the North Coast of Cuba and we began by studying these ores. We found that we could dissolve them, could reduce the ferric solution which resulted, and could precipitate electrolytic iron from the solution. Sulphur-dioxide seemed a desirable reducing agent and we figured on burning pyrites to make this gas. But we found that we needed so much gas that we would have nearly all the iron we could use in the pyrites cinders. This suggested that iron sulphide was the raw material to use. We could roast it as we had planned but that seemed to be taking a step backward in order to go forward later. We tried dissolving it directly in our liquor from our anode and found that with pyrrhotite we got excel-



lent results. Pyrite would partly dissolve but not wholly. We found, however, that after heating it to drive off one atom of sulphur, it worked satisfactorily. We are developing the process that is associated with my name.

#### EUSTIS PROCESS

Our process is directed broadly to the treatment of ores of iron with or without other metals, to recover pure iron directly by electrolysis and in most of its applications it yields one or more by-products. It seems now that the most important commercial application of the process will be to the treatment of sulphide ores of iron. Such ores yield a by-product of sulphur and if they contain copper, gold or silver these metals may readily be recovered as by-products and some of the other metals, if present, may also be recovered.

As applied to the pyrrhotite ores, our process is, we feel, very simple. The ore is ground fine and fed to agitator tanks where the iron is taken into solution. The sulphur remains as a precipitate and is separated on filters with any other insoluble material present. The iron goes into solution as ferrous chloride which is pumped to the electrolytic tanks or cells. Here the iron is deposited on the cathode and ferric chloride is generated at the anode. The ferric chloride is the solvent used for dissolving the finely ground pyrrhotite.

If copper is present in the ore, it goes into solution and is precipitated out by adding metallic iron.

It is best to have the liquors hot, both for the solution of the ore and for the electrolysis. The solution reaction is exothermic and liberates around 700 B.t.u. per lb. of iron dissolved. The problem of conserving the heat to maintain the desired temperature of liquor is a mechanical one. We have the experience at Grenoble to guide us.

We get a high current efficiency depositing nearly 1 gm. per ampere hour. The amount of iron deposited per k.w.-hr. is therefore chiefly dependent on the resistance of the cell. This resistance is affected by the temperature of the electrolyte, by its composition and chiefly by the current density, that is, the amount of current that is pushed through a cell of given size. This relation of current density to voltage is so important economically that I want to show it to you graphically. (Fig. 1).

If power costs \$20.00 per k.w.-year, a price that has been offered to us in favorable places, the cost for power, assuming we operate 90% of the time, will be at 1 volt (the lower end of the curve), \$2.44 per ton of iron. At 2 volts it becomes \$4.90

and at 4 volts \$9.80 per ton. The disadvantage of the low current density is that it necessitates a larger plant and larger charges for interest and depreciation.

We have made a contract with the Consolidated Mining & Smelting Company of Trail, B. C., which has been examining our process for nine months, trying it on the pyrrhotite tailings

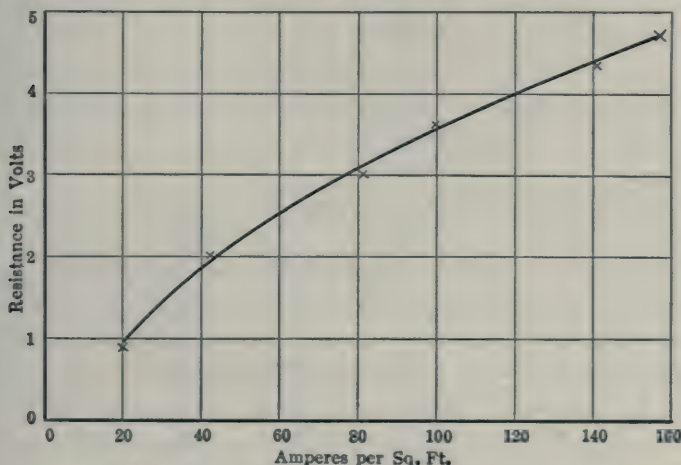


Fig. 1. Current-density and tank-resistance curves

from the zinc plant. The zinc introduces some special problems but we think no insurmountable troubles.

Here (sample shown) is iron which they have made. It contains .04% zinc. We are now building a pilot plant near here, in which we will be able to try out different ores. We expect to start on a Canadian pyrrhotite that is readily available. The pilot plant is laid out for a capacity up to one ton per day but will start at a smaller capacity and be increased as seems desirable.

#### PROPERTIES OF ELECTROLYTIC IRON

Metallic iron that is made by the electrolytic process is very different from iron or mild steel made in furnaces. As deposited, it contains hydrogen but is otherwise very pure. The hydrogen is eliminated by annealing and it then forms the purest iron we know. When fresh it is white like silver and very ductile like copper. On continued cold working, it gets harder and stronger but the hardness does not increase beyond a certain point. (Fig. 2).

This makes it very attractive for cold rolling, deep stamping and drawing. In drawing wire we have reduced the area to one or two per cent of the original (over 98% reduction of area) without annealing. Much has been said about the resistance to corrosion of electrolytic iron. (Wire and stamped articles shown.)

One sometimes hears that it will not rust. This is not true, but it is true that it rusts much more slowly than less pure iron.

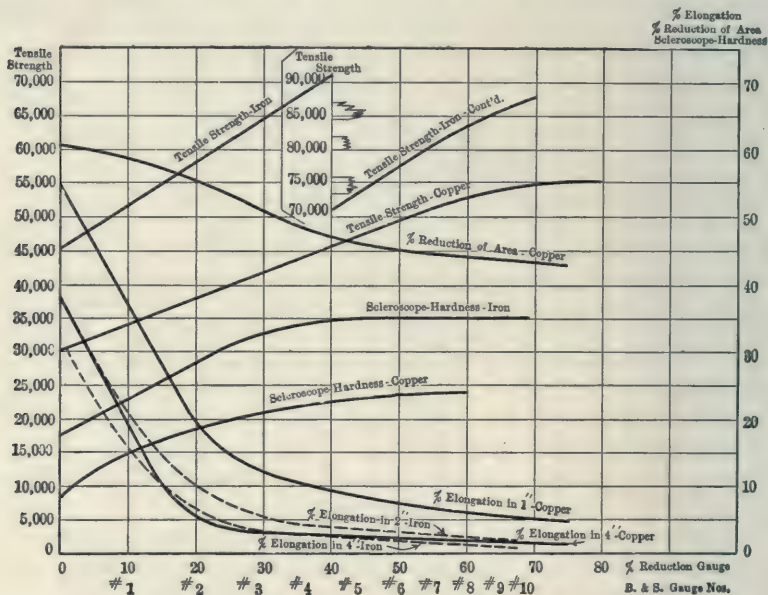


Fig. 2. Characteristic curves of electrolytic iron and copper

For instance, Shelby tubing when exposed to the weather, near the sea, appears to rust about  $2\frac{1}{2}$  times as fast as electrolytic iron. The pure metal conducts electricity and heat much better than less pure iron and it has special magnetic qualities that make it useful in electrical apparatus.

### COMMERCIAL ASPECTS

To date, electrolytic iron is obviously a specialty. It is being made where its special qualities enable it to command a special price. Its qualities are very attractive and its use as a specialty probably will expand pretty rapidly. In France it has proved its advantage for thin boiler tubes, its advantage for deep stamping is assured and it seems probable it can find an im-



portant place in the manufacture of wire. These industries alone might easily absorb a quarter to half a million tons per year.

## POSSIBILITIES

Our Chairman has asked me to consider what are the possibilities of electrolytic iron. Iron is a cheap metal so the possibilities obviously depend largely on the cost at which it can be made.

Before considering the items of cost, I would like to make a few general comparisons between the production of electrolytic iron and the processes for making electrolytic copper and zinc direct from ore.

One striking difference is in the nature of the raw material to be used. In copper work the material leached generally contains the metal to be recovered only to extent of a few per cent of its weight. Zinc concentrates being electrolyzed generally are made from complex ores and therefore contain besides the zinc sulphide, considerable quantities of other sulphides such as iron and copper. When it comes to making iron, the raw material iron sulphide is so common that it is generally possible to secure it in a relatively clean concentrate containing other sulphides to only a small extent. Therefore we are confident that the combating of impurities is going to be less difficult for us.

Another important difference is that with iron we do not have to use a preliminary roast as is necessary with zinc. The monosulphide of iron decomposes with an important evolution of heat and the reaction can be made to run very completely to an end. Finally we believe we are going to have an important advantage in the voltage required which of course means using less power.

Compare the conditions at Ajo on copper for instance where with only 8 amp. per sq. ft. they used 2 volts and at Great Falls on zinc where with 22 amp. per sq. ft. they use 3.8 volts.

In the matter of costs the important elements for us as in most other manufacturing operations are raw material, power, labor, supplies and capital charges, i. e. maintenance, depreciation, interest, etc.

The raw material, sulphide of iron, is one of the common minerals in the earth's crust. Vast deposits are known. The Tharsis company claims to have 100,000,000 tons of ore. I believe many more deposits will be found when hunting for them becomes worth while. Also there are really large quantities that will be produced as concentrates where other metals are

present. Iron sulphide can be bought now all ground for five or six dollars per ton the cost being chiefly controlled by the cost of mining and crushing. The sulphur that can be recovered is worth materially more than this, so in one way of looking at it, the iron in the ore costs nothing.

The cost of power I have shown may be as little as \$4.00 per ton of iron and will vary from this up—depending on the nature and size of the plant and its location. Under favorable conditions, the cost for power will compare favorably with cost for coke used in a blast furnace. The costs for labor and supplies in the small installation are high but I believe that as the process is developed, these items can be brought down. I can see no inherent factor preventing this. The cost for capital charges is a very important figure and one, as I have shown, that must be balanced against cost of power. We do not know any too much about this cost yet but have been thinking of from \$8 to \$12 per ton.

Again reminding you that I am speaking of *possibilities* I say it is quite possible that this electrolytic iron can be made at such a cost that price alone will not control the extent to which the business can be expanded. What are the other limits than cost to the probable extent to which this process can be used?

Some may think that there is not very much cheap power to be had. That may be true if one is looking for cheap power in small blocks. If, however, one can use power in large blocks, there seem to be many places where really large amounts can be had at low cost. The first annual report of the Federal Power Commission states that in 16 months applications for permits for development of water power aggregating 16,825,000 h.p. installed capacity or 11,000,000 h.p. primary power have been filed with it.

The development of this power is mostly waiting for a market. The report indicates that the combined resources of Norway, Sweden and Finland are somewhat less than this. Canada has vast resources so that it seems reasonable to think that there is a least 20,000,000 h.p. to be made available in the U. S., Canada and Scandinavia, or enough power to make 60 million tons of pure iron per year, which is a figure quite as large, probably, as the present output of steel and iron in these countries.

Further, I do not believe that water power will long remain the only means of producing power cheap enough for this business. Water powers today are relatively efficient, we get prob-

ably 80% of the energy of the water as electric energy. Heat engines are relatively inefficient. They have steadily been improved and I am unwilling to believe that the improvement is going to stop or even slow up much. But there is enough water power offering for some time to come.

Ore supply may be a limiting factor but when we think of the tonnages of concentrates and pyrites already known and the quantities of pyrrhotite known in a general way, this limit seems rather far off. Sulphide of iron is about the commonest of sulphide minerals and there is certainly a lot of it available.

The market for the by-product sulphur in the manner in which it is used today is limited. The present consumption in this country and Canada is around 1,500,000 tons per year, which could all be made with not over 3,000,000 tons iron at the most, so it is evident that if this electrolytic iron should grow greatly the ability of the world to use sulphur is likely to be a controlling feature. Very likely the price of sulphur may be pushed still lower and very probably new uses for it will be found—the sulphur mines are already developing such new uses. It may be used as a cement, possibly as a fertilizer and doubtless in other ways. But that enough can be used to keep the present sulphur mines busy and absorb large quantities of by-product sulphur, if it becomes available, seems unlikely.

This indicates that pyrrhotite will be preferred to pyrite for the larger developments because it is less dependent upon the sulphur market. It also suggests that the price and consumption of sulphur may ultimately control the development of electrolytic iron.

Probably some ores which carry other values such as copper, gold and silver, can be worked and made to yield iron without selling the sulphur that is with them.

All this, however, is looking pretty far ahead. To supply half of the present sulphur market, we shall have to produce something like a million tons per year of pure iron. Before we are doing that, other limits may have developed.

So it seems to me that the possibilities are great. I have let my imagination roam a little because our Chairman asked me to and because I hoped that it would be amusing. Do not think that I think for a minute that the road ahead is all easy—far from that—but I do say that it looks like an interesting road.



**The Chairman.**—Mr. Eustis' very interesting paper is before the Section for discussion. I am sure he will be very glad to answer any questions which you may wish to ask him.

**Mr. Witherell.**—Was the current-density-resistance graph with soluble or insoluble anodes?

**Mr. Eustis.**—Insoluble anodes.

**Mr. Witherell.**—I didn't catch the lowest figure.

**Mr. Eustis.**—The lower end of that curve was 0.8 of a volt.

**Mr. Witherell.**—I'd like to see that curve again. (Slide exhibited.)

**Mr. Eustis.**—(indicating.) This is zero, that point is one volt, which gets down to 0.8.

**Mr. Witherell.**—It looks as if it is headed down toward zero.

**Mr. Eustis.**—Of course, any experimental data like this is subject to error. I don't pretend we know by any means all of the history of that.

**Mr. Witherell.**—Now was that curve derived at constant temperature?

**Mr. Eustis.**—Yes, as near as we could determine it that was done at constant temperature.

**Mr. Witherell.**—Then there really is a droop to the curve?

**Mr. Eustis.**—Apparently. I don't think it ought to be there but I plotted it as it worked out.

**Mr. Pyne.**—Is there any deposition below 0.8?

**Mr. Eustis.**—Certainly. We didn't carry the thing to an extreme. Those were simply points at which we determined it. You can exercise your imagination and draw the curve anywhere you want to. I have some of the tubes. If any of you are interested I'd be glad to show them, both the French iron and the American iron.

**The Chairman.**—I am sure that we'd be very glad to hear from Mr. Stoughton in discussion.

**Mr. Stoughton.**—I think one of the most interesting points of this new industry from the scientific standpoint is the quality

of the iron; I should say the properties of the iron. As we get nearer and nearer a pure iron we find we have to give altogether new figures for such properties as the electric conductivity and the magnetic permeability and so on; in other words, it is very like copper. You know a very small trace of arsenic in copper will have an inordinately large effect on the electric conductivity and similar impurities in iron seem to affect the electric and magnetic difficulties and the softness.

We have never had any really pure iron to experiment with, so that the hand-books give you figures of so much electrical resistance per cross-section of what is said to be pure iron. Those are extrapolated from the purest iron they can get, but we find the resistance of this very pure material is much less than the text books give and some of the more recent hand-books will give new figures for those properties.

If we get the purest iron that is now available, without mentioning trade names, but iron containing as low as .03 carbon, as that is rolled or pressed or mechanically treated it becomes

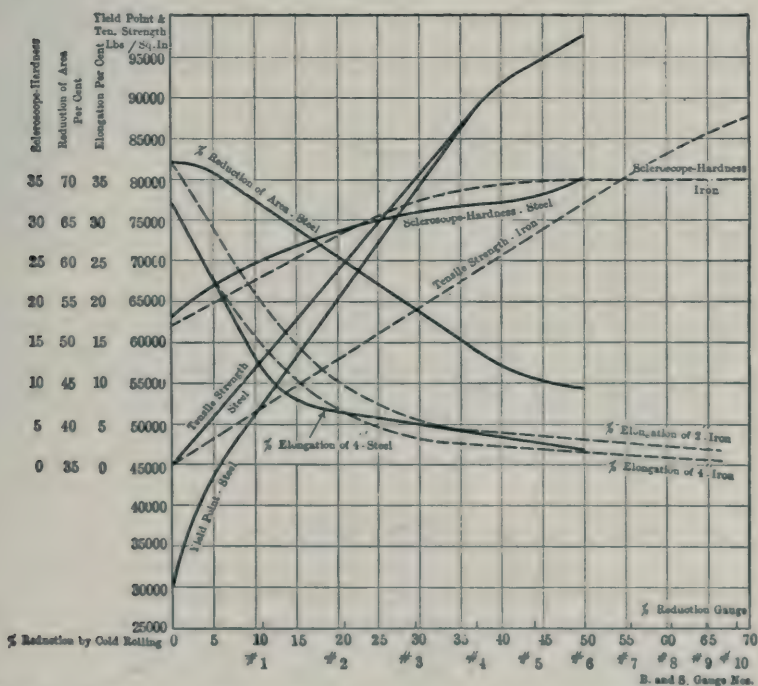


Fig. 3. Characteristic curves of electrolytic iron and cold-rolled soft steel

very hard and we have to anneal it. That is all dependent on these characteristic curves that Mr. Eustis showed, whereas the very pure iron, iron with less than 0.01% impurity, doesn't seem to get hard beyond a certain point; in fact, has been treated cold for a long time without requiring any annealing at all. Now, that has its commercial aspect, since we seem to be talking commercialism tonight, because whenever one anneals for cold rolling one is obliged to pack the steel or iron in air-tight or almost air-tight containers and anneal in a current of reducing gases, illuminating gas or some gas of that kind, and it is a very costly operation, so that one can afford to pay more for a pure material that will cut out maybe two or three annealings.

Then there is another point along the same line that is important. If, for example, one wishes to make a perfect parabola, as one does for an automobile headlight, one presses it out of the purest steel one can get and there is always a certain amount of spring in that steel and in the course of time the spring will bring back the metal and distort the parabola. Now, this material after a certain amount of cold work will take a permanent set and retain it, so that one can if one desires press out a perfect parabola and have it retain its shape. There is a case where the weight of the metal is so very small that the cost per pound in a headlight is negligible and one can afford to pay a good deal higher price for material that will give a superior article. I might go on and tell you a whole lot of things that we have found out about this iron, but it seemed to me that the mechanical side is one of the most interesting from a scientific standpoint and also not without considerable interest in respect to the commercial aspect. (Applause.)

**Mr. Pyne.**—Do you have any trouble with the carbon in the anode with a soluble anode?

**Mr. Eustis.**—In that made in France the carbon is about 0.004 and in the insoluble anode it is about 0.002, but those quantities are so small that it is very hard to determine.

**Mr. Pyne.**—Do you have any trouble with graphite in that hot solution?

**Mr. Eustis.**—It stands it very well.

**A Voice.**—What is the resistance as compared to copper?

**Mr. Eustis.**—It is much greater. It is slightly less than normal iron. About ten micro-ohms per centimeter cube.

**Mr. Stoughton.**—Six times copper. Of course, when you coat it with copper it becomes I think three or four times.



**Mr. Witherell.**—Does it seem to have the same ductility as copper?

**Mr. Eustis.**—I can't think how you measure the ductility. Would you put the next but one of those slides back again? That slide shows curves for copper and iron. It is very much more like copper than it is like iron in its ductility and softness. The metal is extraordinarily like copper in its cold rolling work. Some of the men who have done this deep stamping have insisted they could get somewhat better stamping work with this than they could with copper.

**A Voice.**—Down at Miami we put in copper boilers with steel economizers and after trying with great difficulty to operate them for two years we had to give them up and replace them with the Green economizers with the cast iron tubes.

**Mr. Eustis.**—The Power Specialty Co. of Philadelphia has just imported or we imported for them a considerable quantity of the French tubes and they are putting some of them into their economizers and we will in time have results.

**A Voice.**—What do you do in your process if you run across pyrite?

**Mr. Eustis.**—If you heat it in a neutral atmosphere it volatilizes and can be readily condensed and under any present market values the value of that so condensed is materially more than the cost of recovering it, so that it is commercially an advantage. You can dissolve pyrite by simply grinding it fine and without preliminary treatment, but it is much slower and less attractive to work with. Our theory about it—I suppose commonly accepted—is that the sulphur is in some form of cold solution and it seems to cover up and protect it and we find in order to manufacture economically that sulphur is one of our best materials to build on. It seems to resist hot ferric chloride better than anything else and it seems natural if the sulphur is there in a solid solution that it should have that protective action and it certainly seems to.

**The Chairman.**—Mr. Thum, won't you tell us your views?

**Mr. Thum.**—I don't know that I have much to add. It occurs to me that one very important use for pure iron will be as a raw material for pure steel. Only today I received a letter from the Chief Metallurgist of the Cadillac Motor Car Co., who had previously written to me asking for information regarding hydrogen in iron and steel. I wrote back to him asking him what on

earth the Cadillac Motor Car Co. wanted to know about hydrogen in iron and steel for and he said, "We have more trouble from dirt in steel than all other troubles put together and we have an idea that hydrogen and various oxides in steel have a very close connection with dirt in steel. We also know that dirt in steel is something that cannot be provided against by the best engineering brains and the best designing talent to the biggest factor of safety. It is something that we provide against now by careful examination of our metal in a microscopic way rather than a chemical way. We have even gone so far as to specify methods of manufacture and we have also blacklisted certain manufacturers who are absolutely unable to get us a material of the proper quality."

Well, this question of dirt in steel is undoubtedly one of the greatest things before the user of alloy in fine steel at the present time and one very good way of staying away from dirt in steel is by using raw materials of the greatest excellence. I know that the manufacturers of crucible steel have a great deal of difficulty in getting high-grade wrought iron and high-grade iron with which to make their steels and it certainly seems to me that the electrolytic iron, if it can be produced at a price at all commensurate with Swedish iron and in quantity, would undoubtedly be a very attractive proposition for the manufacturers of crucible steel, in view of the uncertainty of their supply at times and the present high price.

Secondly, it certainly seems to me that one of the greatest outlets for high-grade electrolytic iron would be as a raw material for the base of the alloy steels and of course there are thousands of tons of those on the market and in use at the present time.

**Mr. Lyon.**—Although we haven't followed this process to any extent, we have been watching to see what it might do as regards the solution of this low-grade copper problem out on the Pacific Coast; in other words, we are just waiting, watchfully waiting, but it may be that this process may be of very great assistance in the West.

Now, with regard to the dirty metal problem. Mr. Thum has stated truly that it is one of the greatest problems of today; that is, the problem of furnishing pure steel. I hope to see in the near future an investigation that will have for its object the solution of this problem; in other words, we don't know very much about why it is that we have this dirty steel. I don't believe we will ever get to a solution of the problem of dirty steel until we get right back to the fundamentals. I can't hope nor see that electrolytic iron is going to solve the problem. I think they are

going to get a better iron, but apparently it seems to me we have got to go back and find out how to make pig iron.

**A Voice.**—Mr. Chairman, can they not give us some information on the electrolytic treatment of high-grade copper concentrates?

**Mr. Canby.**—It is an interesting subject. We find that everybody feels that is the solution; at least they say that is the proper solution, but my conclusion so far is that there isn't anyone who has suggested anything at all promising. I figure that anything that is done along electrolytic lines is certainly going to help, but only very indirectly.

**Mr. Eustis.**—There is one possible application of this process to the copper end which I would like to say a word more about inasmuch as that question is raised. If it does what I think it is going to do it will solve the problem of treating the flotation concentrate and it may conceivably reduce very materially the amount of flotation concentrate to be made. I have made quite careful analyses of some ores carrying iron sulphides and copper sulphides with which I have been familiar for 30 years, and I have been perfectly astounded in figuring the relative financial return of treating those ores as everyone has been treating them; that is, concentrating them, making a flotation concentrate and smelting them, as compared with treating them directly at a mine which happens to be close to cheap water power, by dissolving both the iron and the copper and precipitating the copper by cementation and then the iron by electrolysis, and the calculations I have made would indicate that in many cases there was a very considerable advantage in not concentrating the ore but taking the copper directly into solution with the iron sulphide. I think it would be desirable to make a mass concentrate that would be a clean sulphide but one that would contain the iron sulphide and the copper sulphide not separated.

**Mr. Channing.**—Would you think in Tennessee we are working along the wrong line?

**Mr. Eustis.**—Absolutely.

**Mr. Channing.**—What we are doing there, and I think Mr. Westervelt is doing it, is to take the fine ore which possibly carries 2% copper—that would be a little high for it—and make a selective flotation and get a copper concentrate that will run possibly 15% copper and then smelt that, then we can make a middling which will run 50 to 53% iron, from 32 to 34% sulphur and not to exceed 3/10% of copper and then a siliceous gangue



which is thrown away. Now Mr. Eustis thinks probably we are wrong in making that separation of the two sulphides.

**Mr. Eustis.**—Excuse me, probably I spoke hastily. What I meant to say was the time might come when you would see the way to change.

**Mr. Channing.**—That is, the time would come when it would be well to eliminate the gangue?

**Mr. Eustis.**—I think we will first do what you are doing; that is, take the copper out and get that much ready money that isn't dependent on any new process and then fuss with the tailings, but all of that is dependent on cheap power.

**Mr. Ingalls.**—Would you define what you consider cheap power?

**Mr. Eustis.**—The price I mentioned here of \$30 a horsepower a year I would call cheap power. We have thought in a general way that up to \$35 was quite workable and when they asked us \$45 or \$50 we began to think it was expensive, but it is all relative, it depends on what your products are worth and what your other items of cost are. In a number of places we have been offered power at \$20.

**Mr. Channing.**—That is about three mills a kilowatt hour.

**Mr. Rogers.**—Did you say the cost of power was \$2.40 a ton?

**Mr. Eustis.**—Yes, with one volt.

**Mr. Rogers.**—What do you do about the impurities in the electrolyte?

**Mr. Eustis.**—The impurities are of course a very vital question. The producers of zinc generally have kindly shown us how to get rid of arsenic and antimony. Add a small amount of ferric iron and precipitate it with a base and the arsenic and antimony will come out very satisfactorily, whereas zinc is a thing we haven't worked out. This piece of metal was made from a high zinc tailing and it has 0.041% of zinc in it. There are two possible methods of precipitating the zinc that seem possible commercially. One is with hydrogen sulphide and the other is a soluble alkaline sulphide, but if the metal is annealed a considerable portion of the zinc is removed and if the metal is made for use in alloy steel the zinc is eliminated by melting. Copper is easily eliminated by adding small amounts of iron powder or scrap iron as you prefer. Cadmium we thought a lot about. It comes out much as zinc does and apparently easier. Each ore undoubtedly is a problem and it is impossible to see all the diffi-

culties. One obvious thing to do is waste a certain amount of electrolyte and in that way eliminate the things that cannot be eliminated in any other manner.

**Mr. Pyne.**—Do you find much trouble with chlorine remaining in the product?

**Mr. Eustis.**—We haven't found any. It may be there but we haven't been able to find it. I can't see any reason why it should. It seems to me it ought to go to an anode and of course a great part of it goes to the anode.

**Mr. Ingalls.**—Will you describe the chemical part of the process—the separation of sulphur?

**Mr. Eustis.**—These are the reactions of the process. The first reaction is the reaction between ferric chloride and iron sulphide and gives ferrous chloride and sulphur. The second reaction is the decomposition in the electrolytic cell of ferrous chloride under the action of the electric current it gives iron at the cathode with the chlorine ions migrating to the anodes and forming ferric chloride. We aim to maintain the concentration of the ferric chloride at the anode about twelve grams to the litre. We put the same amount of ferrous chloride; that is, we aim to maintain always an important margin of safety between complete oxidation and the state that we have reached, because if too much chlorine should be allowed at the anode some of it might go out.

**Mr. Ingalls.**—What is your loss?

**Mr. Eustis.**—I don't know. There is a slight loss. There is also a wash loss and that will probably vary at each installation. You have got to put in the same amount of chlorine continuously and the amount will undoubtedly vary under different conditions.

**A Voice.**—You have a diaphragm cell?

**Mr. Eustis.**—Yes, it is a diaphragm cell. The cell is like the caustic soda cell. It has the same graphite anode, it has the same diaphragm.

**A Voice.**—What has been your experience with tank materials?

**Mr. Eustis.**—Sulphur and wood stand very well. Grenoble, which is the plant that has run the longest, has a special concrete. When I was there about a year ago they were ripping out the last of their woodwork and were putting in entirely concrete.

**The Chairman.**—How about the pumps?

**Mr. Eustis.**—The pumps are in the reduced portion of the cycle and are made of ordinary iron at Grenoble. In our plant we have some such and some rubber-lined pumps and I have been studying rather carefully the stoneware pumps we have used with considerable success in our sulphuric acid works.

**A Voice.**—Did you find anything about their special concrete?

**Mr. Eustis.**—I tried awfully hard but I don't think I learned very much. They insisted it isn't special, it is just plain ordinary concrete. Why it stays there I can't tell. We have used concrete in our work and it has been one of the surprises that it lasted as well as it did. Just ordinary common garden cement and sand and it has lasted very well. I think a certain amount of ferric chloride collects on it and that probably protects it.

**Mr. Rogers.**—Perhaps some of the older members remember Charles W. Bradley put up a leaching plant and he had filter beds made of a porous brick and he laid them in a mixture of sulphur and sand.

**Mr. Eustis.**—That seems to stand well.

**Mr. Westervelt.**—Have you used P. & B. paint?

**Mr. Eustis.**—I think I have tried it in our SO<sub>2</sub> plant. I don't think we have tried it in the chloride.

**Mr. Westervelt.**—In some chloride work I was doing some years ago that seemed to hold extremely well, particularly on wood.

**The Chairman.**—Is there any further discussion? If not, a vote of thanks to Mr. Eustis for a very interesting paper is in order and the meeting will stand adjourned thereafter.

## NECROLOGY

The following members were reported as deceased during the year 1922.

| Year of<br>Election | Name              | Date of Decease |
|---------------------|-------------------|-----------------|
| 1918                | ARGALL, Philip    | March 19, 1922  |
| 1917                | BURGER, C. C.     | March 10, 1922  |
| Charter<br>Member   | HUTCHINSON, E. S. | Feb. 17, 1922   |
| 1908                | GEMMELL, R. C.    | Oct. 25, 1922   |
| 1912                | MAGNUS, Benjamin  | March 12, 1922  |



# STANDING COMMITTEES

## Executive Committee

ALLEN H. ROGERS

W. R. INGALLS

J. E. SPURR

W. Y. WESTERVELT

DONALD M. LIDDELL

## Occupational Training

CHARLES A. MITKE, *Chairman*

STANLY A. EASTON

BENJAMIN F. TILLSON

## Technical Education

C. M. WELD, *Chairman*

L. C. GRATON

H. A. GUESS

## Economics

W. R. INGALLS, *Chairman*

J. R. FINLAY

F. W. BRADLEY

## Foreign and Domestic Mining Policy

C. K. LEITH, *Chairman*

H. FOSTER BAIN

S. H. BALL

VAN. H. MANNING

GEORGE OTIS SMITH

A. C. VEATCH

POPE YEATMAN

H. V. WINCHELL

## Petroleum

A. C. VEATCH, *Chairman*

VAN. H. MANNING

CHESTER W. WASHBURNE

DAVID WHITE, *Consulting*

A. W. AMBROSE, *Consulting*

## Ethics

A. S. DWIGHT, *Chairman*

A. R. LEDOUX

ROBERT LINTON

R. A. F. PENROSE, Jr.

C. M. WELD

## Standardization

C. R. CORNING, *Chairman*

J. PARKE CHANNING

GEO. C. STONE

## U. S. Chamber of Commerce

W. R. INGALLS, *Councillor*

POPE YEATMAN (*Alternate*)

## Research

G. D. VAN ARSDALE

## Mine Taxation

RALPH ARNOLD, *Chairman*

R. C. ALLEN

H. M. CHANCE

B. BRITTON GOTTSBERGER

L. C. GRATON

H. B. FERNALD, *Consulting*

## Licensing of Mining Engineers

W. L. HONNOLD, *Chairman*

J. VOLNEY LEWIS

H. G. MOULTON

F. F. SHARPLESS

A. M. SMOOT

## Metric System

J. W. MERCER, *Chairman*

E. S. BERRY

HUNTINGTON ADAMS



# Mining and Metallurgical Society *of America*



CONSTITUTION

BY-LAWS

RULES

November, 1923

2 Rector St., New York



## OFFICERS FOR 1923

*President*, ALLEN H. ROGERS, 42 Broadway, New York.

*Vice-President*, B. BRITTON GOTTSBERGER, New Haven, Conn.

*Secretary-Treasurer*, DONALD M. LIDDELL, 2 Rector St., N. Y. City.

*Executive Committee*, ALLEN H. ROGERS, B. BRITTON GOTTSBERGER, DONALD M. LIDDELL, W. R. INGALLS and J. PARKE CHANNING.

## COUNCIL

At large, ex-officio.

Allen H. Rogers, New York.....Retires January, 1926

B. Britton Gottsberger, New Haven.....Retires January, 1924

Donald M. Liddell, New York.....Retires January, 1924

Waldemar Lindgren, Cambridge.....Retires January, 1924

J. E. Spurr, New York.....Retires January, 1925

Districts 1-2-3-4-5—Eastern Canada, New England, New York and New Jersey.

J. Parke Channing, New York.....Retires January, 1924

Pope Yeatman, New York.....Retires January, 1924

W. R. Ingalls, New York.....Retires January, 1925

H. H. Knox, New York.....Retires January, 1926

District 6—Pennsylvania, Ohio, West Virginia, Maryland, Virginia, North Carolina, and District of Columbia.

R. A. F. Penrose, Jr., Philadelphia.....Retires January, 1925

Benedict Crowell, Cleveland.....Retires January, 1926

District 7—Minnesota, Wisconsin, Michigan, Iowa, Missouri, Arkansas, and Kansas.

C. K. Leith, Madison, Wis.....Retires January, 1926

District 8—Colorado, Utah, and South Dakota.

Richard A. Parker, Denver.....Retires January, 1924

District 9-10—Northern California, Nevada, and Alaska.

W. J. Loring, San Francisco.....Retires January, 1924

Albert Burch, San Francisco.....Retires January, 1926

District 11—Southern California, Arizona, and Texas.

S. W. Mudd, Los Angeles.....Retires January, 1925

District 12—Washington, Idaho, Oregon, Montana, and Western Canada.

Reno H. Sales, Butte.....Retires January, 1925

## OFFICERS OF SECTIONS

### SAN FRANCISCO

Frank H. Probert, *Chairman*.

Edwin Letts Oliver, *Sec.-Treas.*

### NEW YORK

H. G. Moulton, *Chairman*

Robert Linton, *Vice-Chairman*

Louis D. Huntoon, *Sec.-Treas.*

DOUGLAS, ARMITAGE & MCCANN, New York City, Counsel for the Society.

## CONSTITUTION

*Amended 1919, 1921 and 1923.*

### 1—NAME.

The name of the association shall be MINING AND METALLURGICAL SOCIETY OF AMERICA.

### 2—OBJECTS.

The Society shall have for its objects the conservation of mineral resources, the advancement of mining and metallurgical industries, the better protection of mine investors and mine workers, the increase of scientific knowledge, and the encouragement of high professional ideals and ethics.

### 3—MEMBERSHIP.

The Society shall comprise honorary members, and members who must be qualified by knowledge, experience, and honorable standing to advance the objects of the Society, and shall be proposed for, and elected to, membership as provided in the by-laws of the Society.

### 4—MEMBERS.

All interests in the property of the Society of persons resigning, or otherwise ceasing to be members, shall vest in the Society. No member or officer shall receive salary, compensation, or emolument unless authorized by the by-laws, or by concurring vote of two-thirds of the council. Members residing for a year or more beyond the limits of the United States, Canada and Mexico, shall not be entitled to vote nor to hold office during the period of such residence.

### 5—OFFICERS.

The affairs of the Society, subject to the provisions of the constitution and by-laws, shall be managed by a council of seventeen members, who shall hold office for the prescribed term or terms. The executive officers of the Society shall be a president, a vice-president, and a secretary (who shall also be treasurer), which officers, together with the last two past presidents, shall be mem-

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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bers of the council ex-officio, and shall hold office for one year, or until the close of the meeting at which their successors in office are elected, except that the secretary shall hold office until his successor accepts transfer of the duties of that office. Additional officers may be elected by the council from time to time if necessary for the purposes of the Society. All officers shall be eligible for re-election. Vacancy in the office of president shall be filled by the vice-president, who shall then become president, and the council shall forthwith elect a vice-president; and if necessary shall elect a member of council, of which the number must always be seventeen.

### 6—ANNUAL MEETING.

The annual meeting of the Society shall be held on the second Tuesday in January of each year. One-third of the members, present in person or by proxy, shall constitute a quorum for the transaction of business.

### 7—RULES.

The Society may adopt by-laws, rules and regulations for the conduct of its business, provided that these are in harmony with this constitution, and may provide different methods for amending or repealing such by-laws, rules and regulations.

### 8—AMENDMENTS.

Amendments to the constitution may be presented at a regular or business meeting of the Society; and if endorsed by the council, or in writing signed by at least twenty members, a copy of such proposed amendment shall be sent to all entitled to vote, accompanied by comment by the council if it so elects, at least thirty days in advance of a second meeting called for its consideration; at which meeting the amendment may be amended as to wording but not as to intent, and then shall be submitted to a final vote by sealed letter ballot sent to all members; the polls shall be open for sixty days, and for the adoption of the amendment a majority of those entitled to vote shall be required to have been recorded in the affirmative; provided, however, that a negative vote comprising a majority of the votes cast shall defeat the amendment. If the necessary vote for adoption or for rejection is not secured on the first ballot, the council shall order the sending of a second ballot by registered mail to members who have not recorded their vote; and in such case, so many of these second ballots as have been received by members, if not voted within a further period of sixty days shall be counted as votes cast in the affirmative. The ballots shall be voted, canvassed and announced as provided in the by-laws.



## BY-LAWS

*Amended Sept. 5 and Oct. 4, 1911, Mar. 13, 1913, July 19, 1919,  
Jan. 24, 1921 and Jan. 9, 1923.*

### ARTICLE 1—ADMISSION TO MEMBERSHIP.

A candidate for membership or two members proposing him shall submit, in such form and in such detail as may be prescribed in the rules and regulations of the council, a record of his training and practice. The candidate must have had eight years' practical or professional experience, including not less than five years in positions of responsibility in mining or allied lines of work. Graduates of approved engineering schools shall be credited with one-half the time prescribed for graduation. The candidate must be endorsed by three or more members who shall further certify in writing as to his qualifications for membership. These statements must be based on long or intimate personal knowledge, and shall be submitted in such manner as the council may direct. The names of the candidates, after approval by a duly appointed committee of the council, shall be submitted to all members of the Society entitled to vote, with the request that said members of the Society present in writing promptly, any objections that they may have against a candidate on the list. Thirty days after the mailing of the list, the committee of the council shall consider the communications received from members of the Society, and with the approval of the committee, the secretary of the Society shall then submit the name of the candidate to the whole council for sealed letter ballot. The affirmative votes of a majority of the council shall be required to elect, but three adverse votes, received within thirty days, shall be sufficient to defer the election of any candidate, and the council may include the name of any such candidate on the ballot for any subsequent election of members. The application of any candidate shall be considered as pending unless it be withdrawn, or unless by a majority vote of the council the candidate be rejected. A candidate may renew his application a year or more after his rejection.

Any person, not a member of the Society, to whom the gold medal of the Society has been awarded, may become a member of the Society upon his own application.

### ARTICLE 2—ADMISSION TO HONORARY MEMBERSHIP.

Honorary members, not to exceed ten in number, must be proposed in writing, setting forth at length the qualifications of the candidate, and signed by at least twenty members of the Society.

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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The candidate must be elected by vote of the council which shall be by sealed letter ballot. One dissenting vote shall defeat such election. Honorary members are not entitled to vote nor to hold office and shall not be required to pay initiation fees nor annual dues.

### ARTICLE 3—SUBSCRIPTION TO CONSTITUTION AND BY-LAWS.

All elected candidates shall be duly notified, and shall subscribe to the constitution and by-laws in such form as the council may direct. This latter provision shall not apply to honorary members. The membership of any person shall date from the day of his election.

### ARTICLE 4—ANNUAL DUES AND LIFE MEMBERSHIP.

The annual dues shall be ten dollars, payable in advance on the first day of January of each year. Persons elected after nine months of any year have expired shall pay only one-half of the dues for that year. The council may, for sufficient cause, remit the whole or part of dues in arrears. The executive committee of the council may drop from membership any member more than one year in arrears for annual dues, but may reinstate such member at its discretion. The council shall permit any member not in arrears, to become a life member on payment of a sum deemed adequate for the purpose by the council, and based on his expectation of life according to reliable tables of mortality. Such life membership and initiation fees shall be invested and the income only shall be applied to the current expenses of the Society.

### ARTICLE 5—RESIGNATIONS.

Any member, not in arrears in payment of dues, may terminate his connection with the Society by sending his resignation in writing to the secretary.

### ARTICLE 6—DISCIPLINE.

The membership of any person in the Society may be suspended or terminated for reasons of weight by a four-fifths vote of the council. Notice of such intended action shall be sent to such member by registered mail and action shall not be taken for at least thirty days after the receipt of this notice by such member. A member suspended or expelled may demand a sealed letter ballot sustaining the action of the council. This ballot shall be sent to all members entitled to vote and may be accompanied by a statement signed by the council or a committee thereof, and by a state-

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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ment on behalf of the accused. A majority of the votes received within thirty days after the mailing of the ballot shall be required to reverse the action of the council.

### ARTICLE 7—ELECTION DISTRICTS.

The council shall from time to time divide the territory occupied by the membership into twelve geographical districts to be designated by numbers. Each of the districts shall be, as nearly as practicable, contiguous territory; and each shall contain as nearly as practicable an equal number of members. The council shall announce such division to the Society three months before the annual meeting. The council shall consist of the president, the vice-president, the secretary and the last two past presidents; and of twelve members, elected one from each district, and the terms of office of such twelve councillors shall be arranged so that four of them shall expire each year.

### ARTICLE 8—OFFICERS.

The officers of the Society, as provided in the constitution, shall be elected as hereinafter provided, except that whenever a vacancy occurs it shall be filled by a majority vote of the council. Their respective terms of office shall begin at the close of the meeting at which they are elected. The duties of the several officers shall be such as usually attach to the office, or such as may be determined by the council. In the event of the disability of the president, either by sickness or absence from the United States or otherwise, to perform the duties of his office, the vice-president shall act. If both the president and vice-president be incapacitated, a meeting of the council at the earliest possible date shall be called by the secretary and a second vice-president shall then be elected to act in place of the president and first vice-president. In the event of the absence or disability of the secretary, the president may appoint an assistant secretary to act in his place, subject to the confirmation of the council at its next following meeting.

### ARTICLE 9—COUNCIL, DUTIES.

The council shall make such rules and regulations as may be necessary for the proper conduct of the business of the Society, provided that these are in harmony with the constitution and by-laws. The council shall administer the business of the Society and may delegate its powers, except such as are expressly reserved by the constitution and by-laws, to persons or committees. The council may not express opinion for the Society on any public question,



## MINING AND METALLURGICAL SOCIETY OF AMERICA

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but after the membership has expressed an opinion as an act of the Society, the council and executive officers may commit the Society in accordance with the terms of such act and it shall be their duty to promote the purpose of such act.

### ARTICLE 10—COUNCIL, EXECUTIVE COMMITTEE.

The council of the Society shall elect annually from its members an executive committee of five, of whom the president, vice-president and secretary shall be members ex-officio, the two other members to be elected as soon as possible after the annual meeting of the Society. The executive committee, besides performing such duties as may be instructed by the council, shall also act as the membership committee as provided in By-law 1.

There shall be a committee on award of the annual medal, consisting of three members of the Society, appointed annually by the president, but councillors shall not be eligible for this committee.

The council may create other committees, standing or temporary, to which appointments may be made from the membership at large. Temporary committees may be discharged, and standing committees may be abolished by action of the council.

### ARTICLE 11—COUNCILLORS, TERM OF OFFICE.

The term of office of a councillor shall begin immediately upon election. Vacancies occurring at any time in the council, except a vacancy in the office of past presidents, may be filled until the next annual election by a majority vote of the remaining members. At the next annual election new councillors shall be elected to fill such vacancies for the unexpired terms of office only.

### ARTICLE 12—NOMINATIONS.

Not more than 100 days and not less than 90 days before the annual meeting, the secretary shall send a nomination ballot to each member of the Society in the districts for which new councillors must be elected, with the request that he shall nominate three members, in such manner as the council may direct, as candidates for councillor to represent his district; and shall send a nomination ballot to each member of the Society entitled to vote, with the request that he shall nominate one member for president, one for vice-president and one for secretary. Nominations shall be received for 20 days, counted from the time of mailing the ballot, when the polls shall be closed and the ballots counted by the Secre-

tary, who shall report the result to the council. Sixty days before the annual meeting the Secretary, with the advice and approval of the council, shall issue a ballot containing in and for each of these districts not less than two names, which shall be in each case those receiving the largest number of nominating votes; provided, however, that persons receiving less than eleven votes for an executive office and less than seven votes for councillor, may be disregarded, and provided further that no person may stand for more than one office, and when votes are cast for one person for more than one office he shall be placed on the ballot for the higher office. In the event that not more than one person receives the necessary number of qualifying votes, the council may make nominations. The ballot prepared as thus directed shall be mailed to each member of the Society entitled to vote, who may vote for one councillor in each district, having the right to substitute names not on the list, and to cast not over three votes for a single candidate, provided that the total number of votes cast by such member shall not exceed the total number of vacancies to be filled; and who may cast one vote for president, vice-president and secretary, respectively, having the right to substitute names not on the list. The ballot shall be signed, sealed and voted as prescribed in By-law 17.

### ARTICLE 13—CANVASSING BALLOTS FOR OFFICERS AND COUNCILLORS.

At a date to be fixed by the president, within the ten days preceding the annual meeting, the polls shall be closed and the ballots counted by two tellers appointed by the president. Councillors shall not be eligible for such appointment. The candidate for councillor in each district, and the candidate for the respective elective offices, receiving the largest number of votes, shall be elected. In case of a tie the president shall cast the deciding vote.

### ARTICLE 14—MEETINGS OF COUNCIL.

Meetings of the council for the transaction of business may be called at any time by the president, and shall be called at the request in writing of three councillors. Unless for reasons of weight, at least ten days' notice of meetings shall be given. Six councillors, present in person or by proxy, shall constitute a quorum. A letter ballot of the council shall be taken on any question of importance, if so ordered by the presiding officer at any meeting, or at the request in writing of three councillors. Whenever a letter ballot of the council be taken, a majority vote

of the council shall be required to pass the motion put to ballot, except that letter ballots upon candidates for admission to membership shall be decided as provided in By-law 1.

#### ARTICLE 15—MEETINGS OF THE SOCIETY.

The council shall provide for regular stated meetings of the Society, for the transaction of business, or for the reading or discussion of papers, to be held at such times and places as may best serve the interests of the Society. Special meetings of the Society, or of any section thereof, for a definite purpose, may be called by the president, or shall be called on a request in writing signed by twenty members. It shall not be in order at a special meeting to transact other business than that stated in the call for the meeting. No action expressing the opinion of the membership of the Society upon any question of public or professional policy or interest, or endorsing or condemning any matter of public or professional policy or interest shall be taken at any general meeting of the Society unless 20 per cent. of the membership entitled to vote be present in person at the meeting. No action taken by a local section of the Society shall be reported otherwise than to the council, which upon receipt of such report shall act upon it, according to such rules as may be formulated by the council for this purpose, with the view to submitting it, if deemed proper, to the consideration of the Society as a whole. Except for reasons of weight, at least thirty days' notice shall be given of all meetings, other than meetings of sections.

Except as hereinbefore provided, resolutions endorsing or condemning matters of public or professional interest, or expressing the opinion of the Society, shall take such course as may be prescribed by the council in duly formulated rules, but such rules must provide that not less than 30 days after date of mailing be allowed for any ballot of the membership. Upon the declaration of the result of any ballot by the president, it shall become an act of the Society and shall remain in effect until rescinded. It shall be the duty of the officers and council of the Society to make effective an act of the Society in every proper way.

#### ARTICLE 16—LOCAL OR PROFESSIONAL SECTIONS.

Local sections, or professional groups of members of the Society, may be organized for social, scientific and professional purposes, in harmony with the constitution and by-laws, and any such section shall have only such powers as are prescribed by these



by-laws, and shall act under such rules and regulations as the council may from time to time approve.

### ARTICLE 17—LETTER BALLOTS.

When sealed letter ballots are required by the constitution or by-laws, the envelopes to contain the ballot shall be so designed that one of them can and must be signed on the outside by the voter for identification, and can afterward be opened by the tellers so as to preserve the secrecy of the ballot. The ballots signed and sealed shall be mailed or delivered to the secretary, who shall be responsible for their safe-keeping, and who shall make record of such receipt on a list of members kept for the purpose. Any member shall have the privilege, at any time before the closing of the polls, of substituting another ballot, in which case the original shall be returned to him unopened. After the closing of the polls, the ballots, arranged in alphabetical order, with the check list of members above mentioned, shall be delivered by the secretary to tellers appointed by the president. The tellers shall verify the check list, and open the ballots only in such manner as to preserve the secrecy of them. The ballots after being counted by the tellers, shall be destroyed upon order of the president, and the report of the tellers shall be the official record of the vote. In case a supplementary ballot shall be ordered for members failing to vote on the first ballot, the members whose votes have been counted shall not be permitted to vote a second time nor to change their original vote. The result of the ballot shall be communicated to the members of the Society immediately by the president, who shall declare the vote.

### ARTICLE 18—BALLOTS OF COUNCIL.

Letter ballots of the council which need not be sealed, may be conducted either by mail or telegraph as instructed by the president. In the cases of letter ballots for election of members, award of annual medal and on questions of discipline of members the vote may be canvassed as soon as the entire seventeen members of the council have responded, but in the absence of response from all of the members, the polls shall remain open for 30 days from the time of issuance of the ballot, at the end of which time the votes received shall be counted and the result reported. In all other cases the ballot may be reported and the motion be declared carried or defeated as soon as the requisite number of votes have been received. Except where expressly provided to the contrary by the by-laws, a majority vote of the

council shall be sufficient to pass the motion put to ballot. Council ballots shall be opened and tallied by the secretary, who shall hand them to the president, who shall declare the result and cause it to be entered in the minutes of the council meeting next following.

#### ARTICLE 19—VOTE OF CONFIDENCE.

The council, by a two-fifths vote of its members or upon request in writing of twenty per cent. of the members of the society, shall submit any question to the membership for a vote of confidence. Such vote must be inaugurated within fifteen days after a motion for a vote of confidence has been passed by the council, or a request in writing by 20 per cent. of the members of the Society has been received by the Secretary; and the majority of votes received within thirty days after mailing of the ballot shall decide. In case such question is decided against the council, the members thereof shall forthwith resign office, their resignations to take effect on the election of their successors, and a new election of the whole council shall be immediately ordered to be conducted as provided in the by-laws. The new councillors shall by lot divide themselves into three classes to serve until the next annual meeting and for one and two years thereafter respectively.

#### ARTICLE 20—AMENDMENTS TO BY-LAWS.

Amendments to the by-laws may be proposed at any meeting of the Society, or at any meeting of its sections, or at any meeting of the council. If approved by the council, the proposed amendments shall be submitted to the membership for letter ballot and a majority of the votes received within thirty days shall pass or defeat the amendment, the result of the ballot to be effective immediately upon its declaration by the president.

## RULES AND REGULATIONS

### *A.—Rules Governing Resolutions.*

1. Resolutions upon matters of interest to the Society, or upon matters that it is desired to submit to the entire membership of the Society, other than amendments to the constitution and by-laws, may be introduced at any meeting of any local section. Upon adoption by such section, the secretary of the section shall communicate the resolution as adopted to the secretary of the Society, who shall promptly lay it before the council. The council, after consideration of such resolution, shall (1) submit it to the membership of the Society for vote by letter ballot as provided in the by-laws; or (2) make such amendment as in the opinion of the council is desirable, without, however, altering the intention of the resolution, and then shall submit it to vote by the Society; or (3) reject the resolution and return it to the section that communicated it, with the reason for rejection.

2. A local section when notified by the council of the rejection of a resolution may reiterate that resolution; and upon receipt by the council of report of such action, the council shall then promptly submit the resolution to the membership of the Society, without amendment, but the council may accompany the resolution with a memorandum respecting its own action in the case.

3. If the council receives resolutions bearing upon the same subject from two or more local sections, the council shall select for submission to the Society that which in its opinion is the most adequate for the purpose intended; or the council may frame a composite resolution, to which new matter may be added, and shall submit such resolution to the membership of the Society as a resolution proposed by the council in lieu of those adopted by two or more local sections.

4. Any seven members of the Society, not affiliated with any local section, may unite in presenting a resolution to the council, and the council shall act upon such a presentation in the same way as provided under Rule 1.

5. The council itself may initiate a resolution and submit it directly to the membership of the Society for letter ballot.

### *B.—Rules Governing Local Sections.*

1. Local sections of the Society may be formed for promoting social intercourse among members, and for reading papers, and discussing subjects pertinent to the objects of the Society,



and not inconsistent with the constitution and by-laws of the Society.

2. Such sections may be organized wherever there be 15 members in any city or town, or in places adjacent thereto, upon the request of 10 or more of such members addressed to a councillor, who may thereupon call a meeting of members residing within the limits of the proposed section, and if not less than seven members attend such meeting, they may thereupon organize such section, elect officers, comprising at least a chairman and a secretary, and adopt rules and regulations for their local government, not inconsistent with the constitution and by-laws of the Society; provided that said rules and regulations, or any subsequent amendment thereof, shall forthwith be submitted to the council of the Society, and shall not become effective until approved by the council; and provided, that all members of the Society residing or engaged professionally in the district included by any section shall be invited to become members of said section; and provided that any such member, upon application and upon complying with the rules and regulations of said section, shall be admitted to membership therein; and provided that all expenses incurred by said section, except as noted below, shall be defrayed by said section.

3. The secretary of each local section shall notify the secretary of the Society as to the names of members enrolled in his section and shall promptly inform the secretary of the Society respecting any resignations from or additions to membership. In the event of any dispute as to membership, or the right to enroll members, the matter shall be referred to the council of the Society, whose decision shall be final.

4. The Society will pay, on request, two-thirds of the actual cost of stenographic reports of the meetings of any section, provided that the amount so paid does not exceed one-half the dues paid into the general treasury by the members of such section, nor exceed \$100 in any one year.

5. Dues or assessments for the defrayment of the expenses of local sections shall be levied as each section shall determine, but shall not exceed \$5 per member in any one year. The failure of any member to pay such section charges shall be reported to the council of the Society and delinquency for more than one year after notice has been served shall be a reason sufficient for the suspension or termination of the membership in the Society of such delinquent member. Any member not in arrears in payment of section-charges may terminate his connection with any section by written notification to the secretary thereof. If by resignation, or other-

wise, the membership of any local section shall fall below 15, the existence of such section may be terminated by the council.

6. The proceedings of local sections, including papers and discussions, shall be reported to the secretary as hereinafter provided. No section shall, without the approval of the council of the Society, permit any account of its proceedings or of its papers or discussion to be printed in any newspaper or technical publication, nor shall any such section print or publish any proceedings, without the assent and approval of said council, nor issue any printed matter, except the necessary notices, etc., relating to the management of the section. No section shall at any time perform any act or deed which is properly a function of the Society.

7. The geographical limits of each local section shall be subject to such amendment or limitation as the council of the Society may from time to time determine.

8. All members of the Society shall have the right to attend all meetings of all sections.

9. Honorary members of the Society shall be exempt from dues to any local section.

10. The order of business at meetings of local sections shall be:

- a. Reading of minutes of previous meeting.
- b. Transaction of business.
- c. Discussion of professional and technical questions.

11. The proceedings at each meeting of each section shall be promptly reported by the section-secretary to the secretary of the Society.

*C.—Rules for Award of Annual Medal.*

1. A gold medal shall be awarded by this Society for conspicuous professional or public service for the advancement of the science of Mining and Metallurgy, or of Economic Geology; for the betterment of the conditions under which these industries are carried on, for the protection of mine investors, and especially for the better protection of the health and safety of workmen in mines and metallurgical establishments.

2. This medal shall be awarded at such times as may be determined by the council.

3. The council shall determine the specific object for which the medal shall be awarded, and the members of the Society shall be asked to nominate candidates on a form provided for the pur-

pose, such nominations to be accompanied by a full statement of the claims of the candidates for consideration. These nominations shall not be confined to members of the Society and may include other nationalities than our own.

4. All nominations shall be considered by a committee of three to be appointed by the president. This committee shall submit a list of two names to the council with a full statement of the claims of each candidate. The committee may consider and recommend names not nominated by members of the Society. The names so recommended shall be submitted to the council for election by letter ballot.

5. For the election of a candidate a majority vote of the council shall be necessary. If this majority be not obtained on the first election other ballots may be taken either by letter or at a meeting of the council called for the purpose. At such meeting members of the council may be represented in proxy.

*D.—Rules for Publishing the Bulletin, and for Reporting Minutes of Local Sections.*

1. The Society shall publish monthly (and at intermediate times when necessary) a bulletin, which shall be the official record of the proceedings of the Society, and of its local sections. The bulletin shall be published under the direction of the Secretary of the Society and shall contain announcements by the officers, the minutes of meetings of local sections, communications from members, and such other matter as in the opinion of the council or of the officers of the Society may be proper and useful in promoting the purposes of the Society.

2. The regular numbers of the bulletin shall be published on the last day of each month, or as near thereto as is possible, but the council may for reasons of weight delay the publication of any bulletin.

3. Secretaries of local sections shall be responsible for the primary editing of the reports of meetings of their sections and shall deliver to the Secretary of the Society a properly prepared manuscript report, in duplicate, each copy signed by the section-secretary.

4. The Secretary shall file one of these copies among the official records of the Society and shall use the other copy in connection with the preparation of the bulletin.



5. Matter intended for publication in any bulletin must be delivered to the Secretary of the Society before the twentieth day of the month of publication, unless the publication of the regular bulletin has been delayed by direction of the council.

6. The Secretary may, for reasons of weight, withhold matters submitted for publication in the bulletin, other than official announcements by the officers of the Society or by the council; but in the event of such withholding he shall forthwith notify the President and present the case to the council, at its first following meeting, which shall act upon it.

## LOCAL RULES

### NEW YORK SECTION

1. The officers of the New York Section of the Mining and Metallurgical Society of America shall be a chairman, a vice-chairman and a secretary, who shall be elected at the last meeting before the summer of each year, and shall hold office for one year from that time. These officers shall constitute the executive committee of the section.

2. The expenses incurred by the section shall be divided equally among all its members, and shall be payable at such times as the executive committee shall name.

3. In the absence of the chairman and vice-chairman, the meeting shall elect a chairman *pro tem*, to serve at that meeting. In the absence of the secretary, the chairman shall appoint an acting secretary to serve for that meeting.

4. The secretary shall keep a record of the proceedings of the meetings, and immediately after each meeting shall forward to the general secretary of the Society a report of the proceedings.

5. The presence of seven members of the section at a meeting shall constitute a quorum.

6. Members shall have the privilege of bringing guests to ordinary meetings of the section, but not to meetings previously announced as executive.

## ANNOUNCEMENT

*Adopted by the Council and published in the first bulletin of the Society.*

It has been decided by the council of the Mining and Metallurgical Society of America to issue to the members a monthly bulletin similar to this, which will record the proceedings of the Society. In presenting this, the first bulletin of the Society, it is deemed desirable to outline the purposes of the Society suggested in the preliminary correspondence among those who became the charter members and developed in the discussion at the organization meeting. It is contemplated that the Society will enter immediately into five principal fields of activity, as follows:

(1) The establishment of local sections, to promote acquaintance among the members, good fellowship, and the interchange of views respecting technical and professional matters. It is intended that these local sections shall hold frequent meetings, probably once a month, all of the sections to hold their meetings on the same day. It has been suggested that these meetings take the form of a dinner, or smoker, to be followed by conversation and discussion. Such action as may be taken upon matters of interest will be reported to the general secretary and published in the monthly bulletin of the Society. If in the opinion of the council of the Society any matter be of such general importance as to deserve discussion by all of the sections, they will be requested by the general secretary to take it up. In addition to the meetings of the local sections, there will be in each year at least one meeting of the whole Society.

(2) The determination of standards in engineering practice, such as is being done by the Institution of Mining and Metallurgy. The Institution has from time to time appointed committees to consider technical questions as to which there is confusion, with the view to recommending a standard of practice that all members of the Institution are urged to adopt. Among the questions that have been taken up by the Institution of Mining and Metallurgy are the definition of what constitutes the development of ore, the establishment of a standard of screens for use in screen analysis, and an agreement as to weights and measures commonly employed in mining and metallurgical work. Efforts to secure standardization and uniformity of methods have also been made by other technical societies. There is a great field for useful work in this direction, and it is considered to be one that the Mining and Metallurgical Society of America may profitably enter.

(3) The discussion of questions relating to professional practice and ethics, with a view to the gradual formulation of rules for guidance, determined by the consensus of opinion in the Society. Mining and metallurgical engineers are accustomed to speak of themselves as professional men, but in their actions they often show that they do not seriously regard themselves as such. This may be due to a large extent to vagueness in ideas respecting professional propriety. Consequently, it is considered that the Mining and Metallurgical Society of America will serve a useful purpose in discussing details of professional practice, such as the relation between the engineer and his clients, the matter of contingent fees, the communication of gratuitous advice. These are merely a few matters which suggest themselves. It is considered that a discussion of such questions relating to professional practice and ethics, will lead eventually to the establishment of a code of ethics, developing the brief but comprehensive treatise on this subject by Sir Francis Bacon in the preface to his "Maxims of the Law" as follows: "I hold every man a debtor to his profession; from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto."

(4) The discussion of questions of public policy in which the profession of mining engineering is directly concerned. There are many questions arising in connection with the federal and state governments, which have a direct bearing upon the interests of the mining and metallurgical engineer, just as in the case of other professional men. For example, there has lately been a movement in the State of New York to compel every analytical chemist to secure a license from the State before being permitted legally to practice his profession; similarly it has been suggested that the states should pass laws requiring mining engineers to be licensed. It is no part of the present purpose to discuss or put any weight upon these particular propositions; they are mentioned merely as examples of matters of public policy which come up from time to time, affecting the profession of mining and metallurgical engineering, in connection with which the profession has heretofore had no means of expressing the consensus of its opinion. The Mining and Metallurgical Society of America will be a medium for the expression of such opinions.

(5) Finally, it is intended that the Mining and Metallurgical Society of America shall be a strictly professional society, i. e., membership in it will be limited to the ranks of the mining and metallurgical engineers, and mining geologists. Serious qualifica-



tions are prescribed as a prerequisite to membership, and it is the purpose of the founders of the Society to maintain a high standard of personal character and professional ability among the membership. In pursuance of this policy, applications for membership will be subjected to rigid investigation in substantially the same way as is done by the American Society of Civil Engineers. It is hoped that this will cause the Mining and Metallurgical Society of America soon to become recognized as representative of the best in the mining and metallurgical profession of North America. Membership in the Society obviously will not be an unqualified endorsement, but it will be a recognition of good standing among and by members of the profession, which in many ways will be useful. It is proposed in the list of members of the Society to print brief records of their professional careers.

### DECLARATION OF PURPOSE

At a meeting of the council of the Society, held on Feb. 17, 1921, the following "Declaration of Purpose" was adopted by unanimous vote:

The purpose of the Mining and Metallurgical Society of America is primarily to discuss, digest and take formal action by referendum of all of its members upon those broad principles and questions which affect the mining industry, and which cannot be, or are not covered by other organizations, and then to put into operation, so far as possible, their conclusions.

It excludes from consideration technology, methods, detail, and special interests, in order the more effectively to concentrate its attention upon the fundamental principles and problems affecting the industry, such as labor relations, legislation, economics, and education, with which it may be competent to deal.

At the natural points of contact with other organizations, its purpose and ideal is to establish helpful co-operation.

As typical of its activities and accomplishments may be cited its work respecting safety in mines, oil land and mine legislation, taxation, standardization, and economics.

## CERTIFICATE OF INCORPORATION

We, the undersigned, being desirous of associating ourselves together as a non-stock membership corporation, for scientific, educational and social purposes, as hereinafter more particularly set forth and described, pursuant to and in conformity with the Acts of Legislature of the State of New York relating to membership in non-stock corporations, do hereby certify and declare that we are all of full age, all of us are citizens of the United States, two of us are residents of the City, County and State of New York, and one of us is a resident of the City and State of New York and all of us have had at least eight years' practical or professional experience, including not less than five years of responsibility in mining or allied lines of work.

We do further certify and declare that the particular objects for which this corporation is to be formed, and the qualifications required for active membership therein are as follows, viz.:

**First.** To bring together, as Honorary Members and Members, those who are qualified by knowledge, experience and honorable standing acquired by at least eight years of practical or professional experience, including not less than five years in positions of responsibility in mining or allied kinds of work, for the specific purpose of thereby advancing the particular objects of the Society, to wit: the conservation of mineral resources, the advancement of mining and metallurgical industries, the better protection of mine investors and mine workers, the increase of scientific knowledge, the encouragement of high professional ideals and ethics, and the cherishing of the spirit of brotherhood among its members.

**Second.** That the corporate name by which said corporation, hereby to be formed, shall be known and distinguished, is and shall be:—Mining and Metallurgical Society of America.

**Third.** That the territory in which the operations of said corporation are to be principally conducted is the United States of America, Canada and Mexico.

**Fourth.** That the principal office of said corporation shall be located in the Borough of Manhattan, City, County and State of New York.

**Fifth.** That the number of directors of the said corporation shall be fifteen.

**Sixth.** That the names and places of residence of the persons to be the directors of said corporation until the first annual meeting, are

Walter R. Ingalls, 505 Pearl Street, New York City.

Henry S. Munroe, Columbia University, New York City.

Robert H. Richards, Massachusetts Institute of Technology, Boston, Mass.

William A. Lathrop, 108 South Fourth Street, Philadelphia, Pa.

Henry M. Chance, 819 Drexel Building, Philadelphia, Pa.

William N. Page, 1863 Kalorama Road, Washington, D. C.

Horace V. Winchell, 505 Palace Building, Minneapolis, Minn.

Ernest R. Buckley, Rolla, Missouri.

J. Parke Channing, 42 Broadway, New York City.

Joseph Hyde Pratt, Chapel Hill, North Carolina.

Charles W. Goodale, care Boston & Montana Cons. C. & S. Mng. Co., Butte, Montana.

Philip Argall, 730 Majestic Building, Denver, Colorado.

Frederick W. Bradley, Crocker Building, San Francisco, Cal.

John C. Branner, Stanford University, Cal.

Samuel B. Christy, University of California, Berkeley, Cal.

**Seventh.** That the annual meeting of said corporation shall be held on the second Tuesday of January in each and every year.

**Eighth.** That the duration of the corporation shall be thirty years.

**In Testimony Whereof,** we have made, signed and sealed this certificate in duplicate, and have hereunto set our hands and affixed our respective seals this            day of            , one thousand nine hundred and ten.

(Signed) HENRY S. MUNROE, (Seal)

(Signed) WALTER R. INGALLS, (Seal)

(Signed) ROBERT H. RICHARDS, (Seal)

(Signed) HENRY M. CHANCE, (Seal)

(Signed) J. PARKE CHANNING, (Seal)

The above certificate was signed and acknowledged on dates between Nov. 18 and Nov. 28, 1910, and was filed with the Secretary of State of New York on Dec. 2, 1910, and in the County of New York on Dec. 5, 1910.



## FORMAL ACTIONS

Since its organization, in 1908, the Mining and Metallurgical Society of America has expressed itself formally upon public questions as follows:

**Protection of Mine Investors.**—Adopted by letter-ballot Aug. 7, 1909:

**WHEREAS:** The overvaluation of mining properties by investors and the public, due to ignorance of mining conditions and a lack of appreciation of the real nature of the investment, tends to increase unduly the profits of mine promoters and speculators, and to increase unnecessarily the financial risks taken by mine investors, to the ultimate disadvantage of the mining industry,

**RESOLVED:** That it is the opinion of the Mining and Metallurgical Society of America that, for the protection of shareholders and investors, every mining company should publish an annual report within ninety days of the close of its fiscal year, and such report should incorporate the following information:

1. A brief review of the past history of the property, the work accomplished and the results obtained, with tabulated statement of expenditures and receipts from the beginning, marketable products made each year, and the sums received from the sale of same, the annual net earnings and the disposition made of such earnings.

2. A similar review, but in more detail, of the work of the year, with statements of the assets and liabilities (these statements to show all details as to capitalization of the company; the number and classes of shares outstanding at date of the report; the respective rights of these shares; the number of shares remaining in the treasury; any options or contracts on such shares; any bonded indebtedness); receipts and disbursements, cost sheet and other information as to work accomplished and results obtained.

3. A statement of ore reserves at the date of the report, compared with the reserves of the previous year, with an estimate, by competent authority, of the probable life of the mine.

**Appointment of State Mine Inspectors.**—By vote of the membership, July 18, 1911, it was "Resolved that, in the opinion of the Mining and Metallurgical Society of America, State inspectors of mines should be appointed and should not be elected."

**Supreme Court of the United States.**—By vote of the membership, Jan. 8, 1912, the Society adopted a memorial to the President of the United States calling attention to the importance of carefully considering the mining industry in its relations with the Federal Courts and requesting that jurists of distinction and noted ability and experience in this and associated industries be considered in connection with the filling of a vacancy in the Supreme Court.

**Alaska Coal Lands.**—By vote of the membership, Jan. 8,

1912, the following resolutions respecting the Alaska coal land question were adopted:

1. It is essential for the proper development of Alaska that its coal fields be opened for commercial use without further delay.
2. There are now known to exist but two relatively small fields containing high-grade naval fuel, and inasmuch as the government now possesses no original source of such supply on the Pacific coast it is desirable in the interests of national defense that a selected area of these fields be held and operated under the direct control of the government.
3. All rights which have accrued legally under statutes heretofore existing should be recognized.
4. If it be decided by the Congress that it is to the best interests of public welfare that coal lands in Alaska be leased, we recommend that the following conditions should be embodied in the leases:
  - a. These leases should be made for all the coal in the ground.
  - b. The royalty should be low and based on percentage of selling price of the coal at the mines.
  - c. The minimum annual production upon which royalty is to be paid should be nominal for the first two or three years after the execution of the lease in order to permit and encourage the installation of efficient and durable equipment. After that period the minimum production upon which royalty should be paid should increase more rapidly than the area increases. For example: the minimum production upon which royalty should be paid on a tract of 5,000 acres should be several times more per acre than for 1,000 acres. Such a plan would prevent the tying up of large areas of undeveloped coal territory.
  - d. A due-diligence and forfeiture clause to effect continuous work should be included in the lease.
  - e. Leasehold in coal lands should include all necessary timber, mining and surface rights.
  - f. Leases should not be given for less than 40 acres and in shape should be rectangular, their boundaries being east and west and north and south, and after the system of public surveys has been extended to Alaska and the land applied for is in a surveyed township, the unit areas of a lease should be those established by the government survey as subdivisions of the sections.
  - g. The length of the tract of land embraced within a single lease should not be more than three times as great as its width.
5. It should be clearly recognized as a basic principle that the value to the nation of coal lands in Alaska lies more in their use for industrial, commercial and naval purposes than in the royalties to be derived therefrom, and it is desirable that the revenue obtained from coal royalties inure to the benefit of the territory.

**U. S. Bureau of Mines.**—By vote of the membership, Jan. 8, 1912, a draft for a bill establishing the U. S. Bureau of Mines was approved. (See p. 3, BULLETIN No. 44.)

**A Public Building for Geology and Mining.**—By vote of the membership, Feb. 16, 1913, the Congress was urged to provide in Washington for the joint use of the U. S. Geological Survey and the U. S. Bureau of Mines a fireproof building of an archi-

tectural design reflecting the importance and dignity of the mining industry.

**Patent Legislation.**—By vote of the membership, Feb. 16, 1913, the Society urged the Congress of the United States to hold in abeyance all proposed legislation affecting the patent system in whatsoever way until such time as a proposed commission shall have had time to hold hearings and make a study of the subject and report.

**Oil Land Legislation.**—The following resolutions were introduced by the San Francisco and New York sections. They were amended and adopted by the council on Mar. 13, 1913. They were adopted by letter-ballot on May 1, 1913:

1. There being no laws at present under which oil land can be acquired satisfactorily, a special Federal law should be enacted, governing the acquirement of oil, gas, and asphalt lands, and all lands known or reasonably supposed to contain oil, gas, or asphalt should be disposed of only under the terms of the new law.

2. From time to time, as the desirability of maintaining a stable price for oil may in the opinion of the Secretary of Interior demand, oil, gas and asphalt lands now reserved or hereafter withdrawn shall be thrown open to entry in blocks, of such size as he shall determine. In fixing the size and position of the blocks he shall recognize the principle that the pioneer may properly be allowed a larger area than the one who follows.

3. Prior to the opening of any lands to entry, they shall be properly surveyed and suitably monumented, and they shall be divided into tracts of 160 acres.

4. Where two or more individuals or corporations desire to lease the same tract of land the lease shall be allotted by the secretary upon the basis of competitive bids, the proffers to be in terms of royalty offered, and all royalties to be chargeable and payable in terms of the product. Whenever a lease is thus allotted to a bidder in competition with others it shall consist of such an acreage as shall be fixed in each particular case by the secretary. No lease allotted without competitive bidding shall contain more than 320 acres. No allotment shall be made of any lease or leases unless in the opinion of the secretary the individual or corporation acquiring the lease shall be financially able to develop the property completely and to care for it during and after development in the manner best calculated to bring about its greatest production and least waste, with due respect to neighboring properties.

5. Successful entrymen shall file with the secretary a good and sufficient bond to the amount of \$10,000 for the faithful performance of the terms of the contract. The secretary in making these leases is empowered, in cases where he thinks it advisable, to substitute for the aforesaid bond of \$10,000 either a bond in a less amount or an annual rental for the acreage reserved.

6. Lessees shall commence drilling within a specified and agreed time, and all money expended upon the lease in a bona fide effort to develop oil, gas, or asphalt, or to operate for oil, gas, or asphalt shall apply to the extinguishment of the bond, and when the total amount so expended equals the amount of bond, the latter shall be cancelled.



7. Transfer of leases shall be valid only upon approval whenever in the secretary's judgment such transfer would be contrary to public interest; but he shall not use this power of refusal as a means to exact increased royalty.

8. The lessee shall drill each year an agreed number of wells or shall keep in operation an agreed number of strings of tools unless the local price of oil falls below a certain agreed price. If the lessee forfeits a lease, he shall retain his rights in all wells already drilled and may continue to produce from them so long as he pays the agreed royalty, and forfeited leases shall be immediately open to reletting; provided no drilling shall be done within 300 ft. of an existing well.

9. Line wells must be drilled last, except where it is necessary to protect a lease against adverse drilling.

10. Net revenue from leasing the oil lands should go in large part to the state within which the lands are situated.

**Revision of the Mining Laws.**—By vote of the membership, Mar. 30, 1914, the following resolutions were adopted by the Society:

1. The mining law should be revised not piecemeal, but thoroughly, so as to co-ordinate and harmonize its various provisions.

2. Mining claims should be locatable regardless of a "discovery" and held only so long as the specified development work is performed previous to patenting, provision being made for the patenting and acquiring of absolute title to the property.

3. Placer locations should be limited to deposits of loose material above solid bed rock. The locator should have a preference right to locate also any lodes developed on his placer ground.

4. A statute of limitations should establish a reasonable term of years beyond which placer patents shall be immune from attack on the ground of fraud.

5. Provision should be made for the location and working of petroleum, phosphates, rare earths, haloids, and other mineral substances not specifically mentioned in the present law.

6. Full privilege of appeal to some competent court of law should be provided for in all cases of contests between rival claimants, or between a locator and the government.

7. Notice of mining locations should be so recorded as to give the fullest possible public notice.

8. The apex law should be abolished.

9. Existing titles should be reaffirmed and fully recognized and no effort should be made to create retroactive legislation.

10. For the purpose of giving the fullest consideration to the needs of every branch of the mining industry and every section of the country, it is desirable that a Government commission be created by act of Congress, whose duty it shall be to investigate by every proper means the questions and interests here referred to and to make recommendations as a basis for the proposed mining law revision.

At a special meeting of the Society, at Washington, Dec. 16, 1915, the following resolutions were adopted:

1. The Mining law of the United States should be revised, not

piecemeal, but thoroughly, so as to co-ordinate and harmonize its various provisions.

2. For the purpose of giving the fullest consideration to the needs of every branch of the mining industry and every section of the country as affected by the mineral-land laws of the United States, it is desirable that a Government commission be created by act of Congress, whose duty it shall be to investigate by every proper means the questions and interests here referred to, and to make recommendations as to a basis for the proposed mining law revision.

3. That, in order to represent the classes of men whose interests will be affected, the proposed commission should consist of five members; one representing the legal profession, one representing the Department of the Interior, and three men actively interested and experienced in mining and the acquisition and handling of mineral lands.

4. That this commission shall be selected and appointed by the President of the United States.

5. That this conference believes that the services of such a commission are deserving of compensation, as well as reimbursement for all necessary expenses, but is more concerned with the actual establishment of the commission and its character than with the question of emolument; and will gladly see the work done through an honorary commission if Congress deems it advisable.

6. That this conference expresses itself in favor of the creation of a permanent committee on mining law revision, such committee to consist of five members from the Mining and Metallurgical Society of America, five from the American Institute of Mining Engineers, and five from the American Mining Congress, and to be appointed by these organizations. Such committee to have the power to select its own Chairman and Secretary and to add to its membership not to exceed ten additional mining men or others interested in the subject for which the committee is created. The work of this committee shall be to further the interests of the mining industry through Congressional action in accordance with the resolutions adopted at this conference; and its joint report shall be presented to each of the societies formally represented in its composition.

On Oct. 2, 1916, the Society voted that in a revision of the mining laws of the United States, the following points should be observed:

*Basic Principle.*—It should be aimed to preserve to the maximum possible extent the phraseology of our present mining law and its principles of administration, thus retaining the benefit of some of the wealth of legal definitions that have been rendered at great cost.

The new mining laws should be made to cover all classes of valuable mineral deposits other than coal, and that intention should be defined so clearly that there will be no misunderstanding of it.

*Discovery.*—Actual discovery of a valuable mineral deposit should not be necessary to a valid location of a claim. The new law should authorize mineral locations without discovery in any part of the public lands officially classed as mineral; and mineral locations upon discovery in any part of the public lands, whether officially classed as mineral or non-mineral. However, it should not be possible to secure a patent until a discovery has been made. There should be a provision permitting bona fide prospecting on

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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land classified as non-mineral and protecting the prospector in the meanwhile. One discovery should suffice for a group of contiguous claims of one ownership.

*Location of Claims.*—Mineral claims hereafter located should be 1320 ft. square, i. e., 40 acres. They should not be required to be sub-divisions of the surveyed sections if located on surveyed land. The number of claims locatable by one person or association should be unlimited. Existing regulations concerning the marking, notice and record of locations should be continued. Within 90 days after the date of location, record thereof should be made in the U. S. Land Office of the district.

*Assessment Work.*—Assessment work should be at the present rate, namely, \$200 per 40-acre claim, i. e., \$5 per acre. A person or association holding a group of contiguous claims should be permitted to do the assessment work upon one claim and thereby hold the group, the amount of such work to be equivalent to \$5 per acre for each claim of the group. Emphatic provision should be made to insure the honest performance of annual assessment work. In performing assessment work labor should be reckoned at the current rate of wages for miners in the district. Every holder of a claim should be required to file annually a record of his assessment work, accompanied by vouchers, in the land office of the district.

*Patenting.*—Proceedings for patents should remain as now, with the proviso, however, that only the exterior boundaries of a group of claims need be monumented. Absence of records in the land office of conflicting locations should be taken as prima facie evidence that none exist that are valid. It should be provided that final entry and payment for mining claims should be made within seven years after date of location, exclusive of the time covered by pending adverse claims.

*Abolition of Extralateral Rights.*—Subject to the existing extralateral rights of mining claimants or patentees, the holder or patentee of a mining claim located hereafter to have the exclusive right of possession and enjoyment of the surface held by him and of the minerals under it, bounded by vertical planes, passing through surface boundaries of said land, but not the right to follow any mineral deposit beyond said planes. And the holders or patentees of claims heretofore located to have similar exclusive possession of all the mineral in said claims that is not covered by any existing extralateral rights.

The above article abolishes extralateral rights in so far as any claims hereafter to be located are concerned. The extralateral rights of existing claims may not be taken away, however, wherefore any new location and grant of patent may be made only with the reservation of such rights. The rights of existing claims having been thus expressly preserved, the last sentence of this article confers upon previously located claims the rights to everything comprised within the vertical projection downward of their side lines that is not legally claimed by anybody else, this being thus an addition to the original extralateral rights.

*Appeals from Land Office Decisions.*—The new law should provide for appeals from decisions of the U. S. Land Office to a court of competent jurisdiction.

**Extra War Revenue Tax on Professional Incomes.**—On March 13, 1918, the following resolution was submitted by the Council to a membership vote:

The members of the Mining and Metallurgical Society of America respectfully call attention of Congress to the unfairness of the supertax on professional incomes imposed by section 209 of war revenue act approved Oct. 3, 1917.

Much might be said in favor of a lower income tax on incomes from professions than upon incomes from investments. But there has been no disposition on part of the mining and metallurgical profession to object to the payment of the same income tax as is paid by others, or indeed to any plan of taxation under which engineers are called upon to bear their fair share of the burdens.

It seems, however, unjust that incomes from the practice of any profession, whether engineering, legal, medical, or otherwise, which are the re-



## MINING AND METALLURGICAL SOCIETY OF AMERICA

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sult of personal effort and which provide not only for the current support of the professional man, but also the saving for his old age, should be subject to a heavy supertax, so that the professional man who works for his income is in a worse position than the idle man receiving his income from invested wealth.

Therefore the members of the Mining and Metallurgical Society of America respectfully urge that section 209 of the war revenue act be repealed.

By vote of the Society, April 18, 1918, the foregoing resolution was approved and was brought to the attention of the appropriate Representatives and officials in Washington and was duly acknowledged by them.

**Minerals Control Legislation.**—By vote of the Society, July 1, 1918, the following resolution was approved and was duly brought to the attention of the appropriate Representatives in Washington.

Recognizing the extreme importance of the Minerals Administration Bill now before Congress, the President of the Mining and Metallurgical Society of America, on March 16, 1918, duly called a special meeting to be held in New York on April 18 for the purpose of discussing this Bill and eliciting the opinions of the members. This meeting having been duly held, a meeting of the New York Section, having been properly called, was convened immediately thereafter and the following resolution offered:

"RESOLVED, that it is the sense of this meeting that the general principles of this Bill tend to further the efficiency of the Government in prosecuting the war while safeguarding the welfare of the mineral industry and that this or a similar bill should be made a law, provided, however, that the products covered by said bill as passed shall include only such minerals and metals as are really required for war emergency needs as are those specifically enumerated on page two of draft before this meeting; viz., H. R. 11259."

The minerals alluded to are as follows: "Antimony, arsenic, ball clay, bismuth, bromine, cerium, chalk, chromium, cobalt, corundum, emery, fluor-spar, ferro-silicon, fuller's earth, graphite, grinding pebbles, iridium, kaolin, magnesite, manganese, mercury, mica, molybdenum, osmium, sea salt, platinum, palladium, paper clay, potassium, pyrites, radium, sulphur, thorium, tin, titanium, tungsten, uranium, vanadium, zirconium."

**Action Respecting Mexico.**—Shortly after the death in Mexico of Mr. E. L. Dufourcq the Council determined to take formal action with reference to this cold-blooded murder of a member of the Society and in general regarding the deplorable conditions in Mexico, which then existed (1919) and had been prevalent for a number of years.

In order to make this action effective, the Executive Com-

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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mittee was empowered to draft suitable resolutions, utilizing those which had been submitted to the Council as a basis, with the ultimate object of submitting the question to the membership for a vote. This was done, and the resolutions printed below were mailed in ballot form to the members on June 19.

WHEREAS their professional duties frequently call American mining engineers to Mexico and

WHEREAS the modern mining industry of Mexico has been mainly developed by American engineers and

WHEREAS many American mining engineers have suffered indignities, the loss of their property and even of their lives while travelling or sojourning in Mexico in the peaceful pursuit of their business and

WHEREAS such conditions have culminated in the murder at Teziutlan, on April 16, 1919, of Edward L. Dufourcq, an able and highly esteemed mining engineer and a member of the Mining and Metallurgical Society of America, therefore be it

RESOLVED that the Mining and Metallurgical Society of America hereby protests to the Department of State in Washington against further disregard by the American Government of conditions in Mexico that make it unsafe for American engineers to go there in the practice of their profession and for the care of business interests intrusted to them, and be it further

RESOLVED that the Mining and Metallurgical Society of America urges the American Government to take prompt and effective steps toward the establishment of such law and order in Mexico as will safeguard the persons and property of our citizens and extend its protection to all Americans in any part of the world to which they may be called in the pursuit of their legitimate affairs.

These resolutions were unanimously carried and were placed before the proper officials in Washington and before the Committees of the Senate and House having Mexican affairs in hand.

**Referendum re Labor.**—On December 18, 1919, the following resolution offered by the Committee on Economics was submitted to a ballot vote by all members. 156 votes were cast in favor of the resolution, 10 votes were cast in opposition to it.

RESOLVED: that there should be concerted effort to show labor, as it can be shown, that by sound economic theory labor is the residual claimant upon the produce of industry; that its residual claim in the United States is 70 to 80 per cent. of the whole; that statistics prove that labor gets it; that statistics show that as mind increases the produce of mere manual labor, the latter gets the major part of the increment; that the part of the produce of industry that labor does not get, it cannot get by any economic means; that in trying to get by confiscatory means more than its residual share, labor not only does not get it, but also loses more or less of what it was previously

getting as its residual share; that the only way that labor can get any more than it does now get is to produce more; that slacking in any form, either by working full time at only partial efficiency, or by working only part of the time, is directly opposed to labor's own interest, and that labor is the greater sufferer thereby than anybody else.

### **Referendum on Foreign Ownership of Mineral Resources.—**

At a meeting of the Council held on April 8, 1920, a resolution from the New York Section of the Society was read asking the Council to take favorable action upon Senate Bill No. 3334 which proposes that foreign nationals, owners of mineral and oil lands in the United States, and foreigners interested in our mineral resources in any manner, shall be accorded the same rights and privileges as accorded to our nationals in foreign lands respecting mineral resources in those lands. By order of the Council the following resolution was sent to all members for their approval or disapproval.

RESOLVED, that the Mining and Metallurgical Society of America herewith petitions the Congress of the United States to safeguard the rights and interests of American investors, whether actual or prospective, in foreign mineral industries by providing by statute that no citizen or subject of any country which requires by law, regulation, or otherwise any stipulation in any contract, lease, sale, or other agreement, relating to mines or minerals, including petroleum, in the said country or its possessions or dependencies, which prevents or prohibits American citizens, because of their nationality, from being shareholders, or which limits the number of shares which may be held by American citizens in such undertakings, or which, because of nationality, places restrictions on American citizens holding any position in the company or on the board of directors or similar control body shall be permitted to hold either directly or indirectly any right, title, or interest, in any mine or mineral deposit, including petroleum in the United States or any of its dependencies, or to act on the board or in any managerial capacity whatsoever in connection with any company having any right, title, or interest whatsoever in mines or minerals in the United States or its dependencies, so long as the restrictions before mentioned shall remain in force in any law or regulation or in any contract, lease, or other agreement to which the government of the foreign country or any of its officials or representatives is a party, and be it further

RESOLVED, that no alien company which by its articles of incorporation or association, statutes, by-laws, or in any other similar manner prohibits American citizens, because of their nationality, from being shareholders, or which limits the number of shares which may be held by American citizens, or prohibits American citizens from holding any position on the board of directors in the company shall be permitted to hold either directly or indirectly any right, title, or interest in any mine or mineral deposit, including petroleum, in any part of the United States or its dependencies.

A referendum vote was taken in May, 1920, the result of which was later submitted to the membership in the form of a



letter stating that the result of the referendum upon the principles set forth in the Curtis Bill was an almost unanimous vote in their favor.

**Resolution Re Foreign and Domestic Mining Policy.**—At a meeting of the Council held on January 10, 1922, the action taken by the New York Section at a meeting held December 14, 1921, in adopting the following resolution, was submitted:

WHEREAS, the New York Section of the Mining and Metallurgical Society of America considers the report of the Committee on Foreign and Domestic Mining Policy to be of special and pressing importance in national and international affairs at this juncture, and urges furtherance of the Committee's work in order that the Society may play a part in promoting the cause; therefore be it

RESOLVED, that the New York Section of the M. and M. S. A. approves the report of the Committee on Foreign and Domestic Mining Policy; and be it further

RESOLVED, that the New York Section of the M. and M. S. A. would like to have the co-operation of the Institution of Mining and Metallurgy of Great Britain in the consideration of this report; and be it further

RESOLVED, that the Council of the Society be requested to institute a referendum among the members of the Society, and that an invitation be extended to the Institution of Mining and Metallurgy of Great Britain to co-operate with the Society in the consideration of the subject matter of this report.

The request of the New York Section for a referendum was approved.

At the Council meeting of May 16, 1922, the Secretary was instructed to take a referendum, the form of which was first to be submitted to the Executive Committee for their approval.

Result of the ballot was as follows:

175 replies were received in all.

163 were in favor of the statement of principles as set forth;

10 members took exception in a greater or lesser degree to various parts of the statement of principles;

2 voted against the entire statement.

# Mining and Metallurgical Society *of America*



OFFICERS, MEMBERS AND  
COMMITTEES

July 1, 1923

2 Rector St., New York





## OFFICERS FOR 1923

*President*, ALLEN H. ROGERS, 42 Broadway, New York.

*Vice-President*, B. BRITTON GOTTSBERGER, New Haven, Conn.

*Secretary-Treasurer*, DONALD M. LIDDELL, 2 Rector St., N. Y. City.

*Executive Committee*, ALLEN H. ROGERS, B. BRITTON GOTTSBERGER, DONALD M. LIDDELL, W. R. INGALLS and J. PARKE CHANNING.

## COUNCIL

At large, ex-officio.

|  |                       |
|--|-----------------------|
| Allen H. Rogers, New York.....         | Retires January, 1924 |
| B. Britton Gottsberger, New Haven..... | Retires January, 1924 |
| Donald M. Liddell, New York.....       | Retires January, 1924 |
| Waldemar Lindgren, Cambridge.....      | Retires January, 1924 |
| J. E. Spurr, New York.....             | Retires January, 1925 |

Districts 1-2-3-4-5—Eastern Canada, New England, New York and New Jersey.

|                                  |                       |
|----------------------------------|-----------------------|
| H. H. Knox, New York.....        | Retires January, 1924 |
| J. Parke Channing, New York..... | Retires January, 1924 |
| Pope Yeatman, New York.....      | Retires January, 1924 |
| W. R. Ingalls, New York.....     | Retires January, 1925 |

District 6—Pennsylvania, Ohio, West Virginia, Maryland, Virginia, North Carolina, and District of Columbia.

|  |                       |
|--|-----------------------|
| R. A. F. Penrose, Jr., Philadelphia..... | Retires January, 1925 |
| Benedict Crowell, Cleveland.....         | Retires January, 1926 |

District 7—Minnesota, Wisconsin, Michigan, Iowa, Missouri, Arkansas, and Kansas.

|                                |                       |
|--------------------------------|-----------------------|
| C. K. Leith, Madison, Wis..... | Retires January, 1926 |
|--------------------------------|-----------------------|

District 8—Colorado, Utah, and South Dakota.

|                                |                       |
|--------------------------------|-----------------------|
| Richard A. Parker, Denver..... | Retires January, 1924 |
|--------------------------------|-----------------------|

District 9-10—Northern California, Nevada, and Alaska.

|                                  |                       |
|----------------------------------|-----------------------|
| W. J. Loring, San Francisco..... | Retires January, 1924 |
| Albert Burch, San Francisco..... | Retires January, 1926 |

District 11—Southern California, Arizona, and Texas.

|                              |                       |
|------------------------------|-----------------------|
| S. W. Mudd, Los Angeles..... | Retires January, 1925 |
|------------------------------|-----------------------|

District 12—Washington, Idaho, Oregon, Montana, and Western Canada.

|                           |                       |
|---------------------------|-----------------------|
| Reno H. Sales, Butte..... | Retires January, 1925 |
|---------------------------|-----------------------|

## OFFICERS OF SECTIONS

### SAN FRANCISCO

Frank H. Probert, *Chairman*.

Edwin Letts Oliver, *Sec.-Treas.*

### NEW YORK

H. G. Moulton, *Chairman*

Robert Linton, *Vice-Chairman*

Louis D. Huntoon, *Sec.-Treas.*

DOUGLAS, ARMITAGE & McCANN, New York City, Counsel for the Society.

## PAST OFFICERS

### PRESIDENTS

|                         |           |
|-------------------------|-----------|
| HENRY S. MUNROE.....    | 1908-1909 |
| J. PARKE CHANNING.....  | 1910-1912 |
| HENRY M. CHANCE.....    | 1913      |
| JAMES F. KEMP.....      | 1914      |
| W. R. INGALLS.....      | 1915      |
| J. R. FINLAY.....       | 1916      |
| W. R. INGALLS.....      | 1917-1918 |
| H. H. KNOX.....         | 1919      |
| WALDEMAR LINDGREN ..... | 1920      |
| J. E. SPURR.....        | 1921      |
| ALLEN H. ROGERS.....    | 1922      |

### SECRETARIES

|                             |           |
|-----------------------------|-----------|
| J. R. FINLAY.....           | 1908-1909 |
| HENRY S. MUNROE.....        | 1910      |
| W. R. INGALLS .....         | 1911-1914 |
| F. F. SHARPLESS.....        | 1915      |
| LOUIS D. HUNTOON.....       | 1916-1919 |
| F. F. SHARPLESS.....        | 1919-1921 |
| B. BRITTON GOTTSBERGER..... | 1921-1922 |

### GOLD MEDAL

|      |                          |
|------|--------------------------|
| 1914 | { HERBERT C. HOOVER      |
|      | { LOU HENRY HOOVER       |
| 1915 | ROBERT H. RICHARDS       |
| 1916 | JAMES F. KEMP            |
| 1917 | E. P. MATHEWSON          |
| 1918 | POPE YEATMAN             |
| 1919 | CHARLES EUGENE SCHNEIDER |
| 1920 | E. A. CAPPELEN SMITH     |
| 1921 | CHARLES W. GOODALE       |
| 1922 | ROBERT PEELE             |

# STANDING COMMITTEES

## Executive Committee

ALLEN H. ROGERS

W. R. INGALLS  
J. PARKE CHANNING

B. BRITTON GOTTSBERGER  
DONALD M. LIDDELL

## Occupational Training

CHARLES A. MITKE, *Chairman*  
STANLY A. EASTON  
BENJAMIN F. TILLSON

## Technical Education

C. M. WELD, *Chairman*  
L. C. GRATON  
H. A. GUESS

## Economics

W. R. INGALLS, *Chairman*  
J. R. FINLAY  
F. W. BRADLEY

## Foreign and Domestic Mining Policy

C. K. LEITH, *Chairman*  
H. FOSTER BAIN  
S. H. BALL  
VAN. H. MANNING  
GEORGE OTIS SMITH  
A. C. VEATCH  
POPE YEATMAN  
H. V. WINCHELL

## Petroleum

A. C. VEATCH, *Chairman*  
VAN. H. MANNING  
CHESTER W. WASHBURN  
A. W. AMBROSE, *Consulting*  
DAVID WHITE, *Consulting*

## Ethics

A. S. DWIGHT, *Chairman*  
A. R. LEDOUX  
ROBERT LINTON  
R. A. F. PENROSE, JR.  
C. M. WELD

## Standardization

C. R. CORNING, *Chairman*  
J. PARKE CHANNING  
GEO. C. STONE

## U. S. Chamber of Commerce

W. R. INGALLS, *Councillor*  
POPE YEATMAN, (*Alternate*)

## Research

G. D. VAN ARSDALE

## Mine Taxation

RALPH ARNOLD, *Chairman*  
R. C. ALLEN  
H. M. CHANCE  
B. BRITTON GOTTSBERGER  
L. C. GRATON  
H. B. FERNALD, *Consulting*

## Licensing of Mining Engineers

W. L. HONNOLD, *Chairman*  
J. VOLNEY LEWIS  
H. G. MOULTON  
F. F. SHARPLESS  
A. M. SMOOT

## Metric System

J. W. MERCER, *Chairman*  
E. S. BERRY  
HUNTINGTON ADAMS



**SUB-COMMITTEES OF  
COMMITTEE ON FOREIGN AND DOMESTIC  
MINING POLICY.**

**Chrome**

ALBERT BURCH, *Chairman*  
E. F. BURCHARD  
FRANK PROBERT

**Graphite**

BENJ. L. MILLER, *Chairman*  
EDSON S. BASTIN  
HENRY A. WENTWORTH

**Manganese**

C. M. WELD, *Chairman*  
J. W. FURNESS  
D. F. HEWETT  
ROBERT LINTON  
JOHN A. MATHEWS  
R. A. F. PENROSE, JR.  
BRADLEY STOUGHTON

**Mercury**

GEORGE J. YOUNG, *Chairman*  
MURRAY INNES  
F. L. RANSOME

**Petroleum**

A. C. VEATCH, *Chairman*  
A. W. AMBROSE  
VAN. H. MANNING  
CHESTER W. WASHBURN  
DAVID WHITE

**Platinum Metals**

J. M. HILL  
A. F. KEENE  
J. A. SCHLOSS

**Tin**

G. TEMPLE BRIDGMAN, *Chairman*  
H. H. ALEXANDER  
A. R. LEDOUX

**Tungsten**

FRED W. BRADLEY, *Chairman*  
O. H. HERSHEY  
A. G. MCKENNA

**Vanadium**

W. SPENCER HUTCHINSON, *Chairman*  
HAROLD BOERICKE  
F. L. HESS

# MEMBERS

JULY 1, 1923

(Honorary members are indicated by bold-face type.)

|                          |   |
|--------------------------|---|
| Adami, Charles J.        | Bonne Terre, Mo.<br>General Manager, St. Joseph and Doe Run Lead Cos.                                     |
| Adams, Huntington        | c/o White, Weld & Co., 14 Wall St., New York<br>Mining Engineer.  |
| Addicks, Lawrence        | 51 Maiden Lane, New York<br>Consulting Engineer   |
| Aldridge, Walter H.      | 41 East 42d St., New York<br>President, Texas Gulf Sulphur Co.  |
| Allen, Arthur Watts      | 1424 Scenic Ave., Berkeley, Calif.<br>Chemical and Metallurgical Engineer.                                |
| Allen, John H.           | 160 Broadway, New York<br>Consulting Metallurgist.  |
| Allen, Rolland C.        | Hanna Bldg., Cleveland, Ohio<br>General Manager of Mines, Ogleby, Norton & Co.                            |
| Anderson, H. G. S.       | Hurley, New Mexico<br>Assistant G. M., Chino Copper Co.   |
| Anderson, John C.        | 90 No. Church St., Tucson, Arizona<br>Consulting Mining Engineer.   |
| Appleby, William R.      | Minneapolis, Minn.<br>Professor of Metallurgy; Dean, School of Mines.<br>University of Minnesota.         |
| Argall, George O.        | Leadville, Colo.<br>Mining Engineer; General Manager, Iron Silver Mining Co.                              |
| Arnold, Ralph            | 639 So. Spring St., Los Angeles, Calif.<br>Consulting Geologist and Engineer.                             |
| Arnot, Stanley R. L.     | Plymouth, Amador Co., Calif.<br>Mining Engineer.  |
| Austin, Leonard S.       | 1521 Shatto St., Los Angeles, Calif.<br>Consulting Metallurgist.  |
| Bain, H. Foster          | Washington, D. C.<br>Director, U. S. Bureau of Mines  |
| Ball, C. Leonard         | Casilla 49/50, Antofagasta, Chile. S. A.<br>President and General Manager, Compania Huanchaca de Bolivia. |
| Ball, Sydney H.          | 42 Broadway, New York<br>Mining Geologist.  |
| Bancroft, Howland        | 730 Symes Bldg., Denver Colo.<br>Mining Geologist.  |
| Barbour, Percy E.        | 875 West 181st St., New York<br>Asst. Sec'y., American Institute of Mining and Metallurgical Engineers.   |
| Barringer, Daniel Moreau | 1242 Real Estate Trust Bldg., Philadelphia, Pa.<br>Consulting Mining Engineer and Geologist.              |

## MINING AND METALLURGICAL SOCIETY OF AMERICA

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- Bartholomew, G. P.....120 Broadway, New York  
General Manager, Coal Mining Dept.  
American Smelting & Refining Co.
- Bateman, Alan M.....Yale University, New Haven, Conn.  
Mining Geologist.
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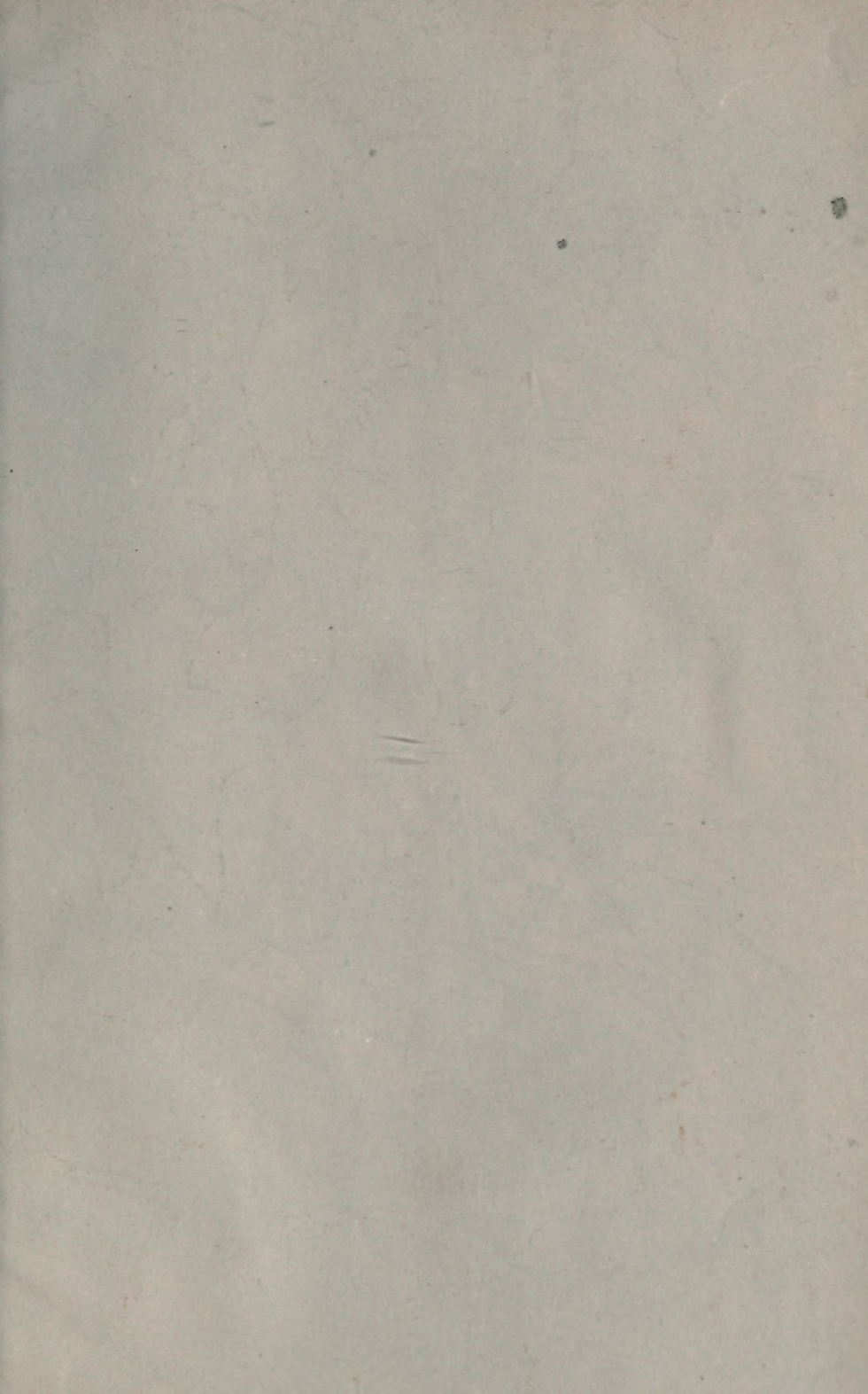


















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